



Information On Demand

Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS

DB2 Performance Monitoring

Ken Kelley

Senior Technical Sales Specialist

IBM Software Group



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ON DEMAND BUSINESS™

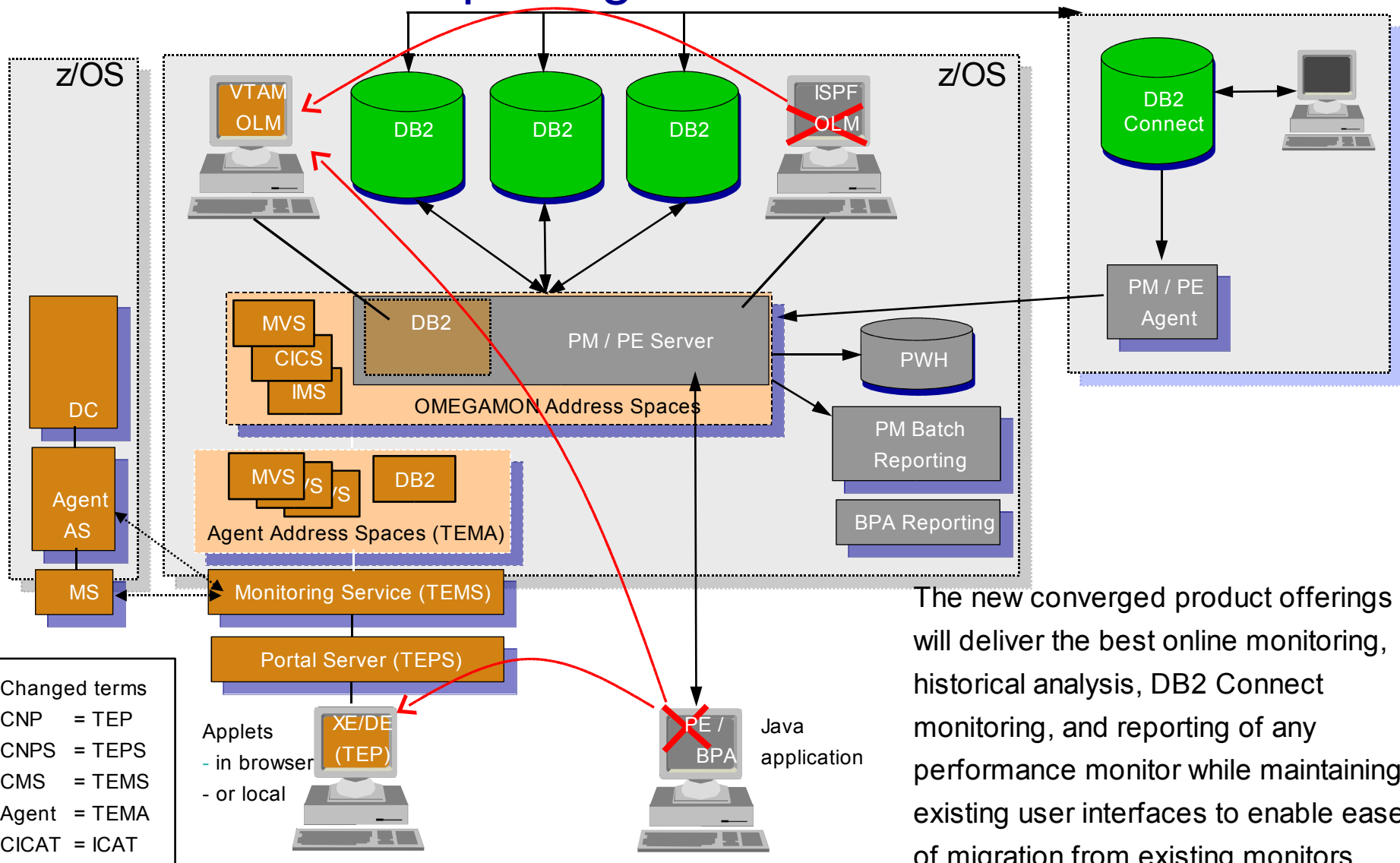
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Agenda

- OMPE Overview
- Trace Data
- Tuning Methodology
- OMPE 3270 Classic Interface
- OMPE Batch Reports

One Server / Reporting / TEP and UI Consolidation



The new converged product offerings will deliver the best online monitoring, historical analysis, DB2 Connect monitoring, and reporting of any performance monitor while maintaining existing user interfaces to enable ease of migration from existing monitors.

Features and Components

Real Time Thread Analysis

- ✓ Thread performance
- ✓ Thread Detail
- ✓ Triggers, Procedures, & UDFs

Real Time - DB2 subsystem

- ✓ Virtual & EDM Pool analysis
 - ✓ Pool performance & snapshot analysis
- ✓ Locking & Logging Analysis
- ✓ Storage Analysis

Application Trace Facility

- ✓ Detailed performance tracing

Choice Of Interfaces

- ✓ (TEP, PE GUI, 3270)

Buffer Pool Analysis (PE only)

DB2 Connect Monitoring

Object Analysis

- ✓ I/O & get page analysis
- ✓ Correlate by object & App

Locking & Lock Conflicts

Historical Analysis

- ✓ Near-term history online
- ✓ Snapshot History
- ✓ Batch reporting
- ✓ Performance Warehouse
- ✓ XE Tivoli Warehouse

DB2Plex Monitoring View

- ✓ CF structure & lock analysis

Automation capabilities

zIIP Engine utilization

Real-Time Monitoring

- Real-time online monitoring of multiple DB2 subsystems:
 - System statistics
 - Thread summary and detail
 - System configuration parameters (DSNZPARM)
 - Bottlenecks (locking conflicts)
 - Object analysis
 - Periodic and Event exception processing
 - Application Trace Facility and SQL Trace
 - Historical data (near-term, snapshot, etc.)
 - Graphical view of important performance data
 - DB2 Connect monitoring

Trace Data

■ Event Trace Data

- Used by online and batch reporting
- Trace records can be sent to multiple destinations
- Allows problem analysis at a very detailed level
- Can be aggregated for trend analysis
- Load into the DB2 PE Performance database
- Application Trace Facility
- SQL Trace

■ Snapshot Data

- Used by online monitoring only
- Takes a snapshot of current DB2 and application activities
- Performs continuous monitoring of individual applications and immediately reports events such as conflicts and exceptions
- Useful when a problem has recently occurred or persists

History

■ Recent History

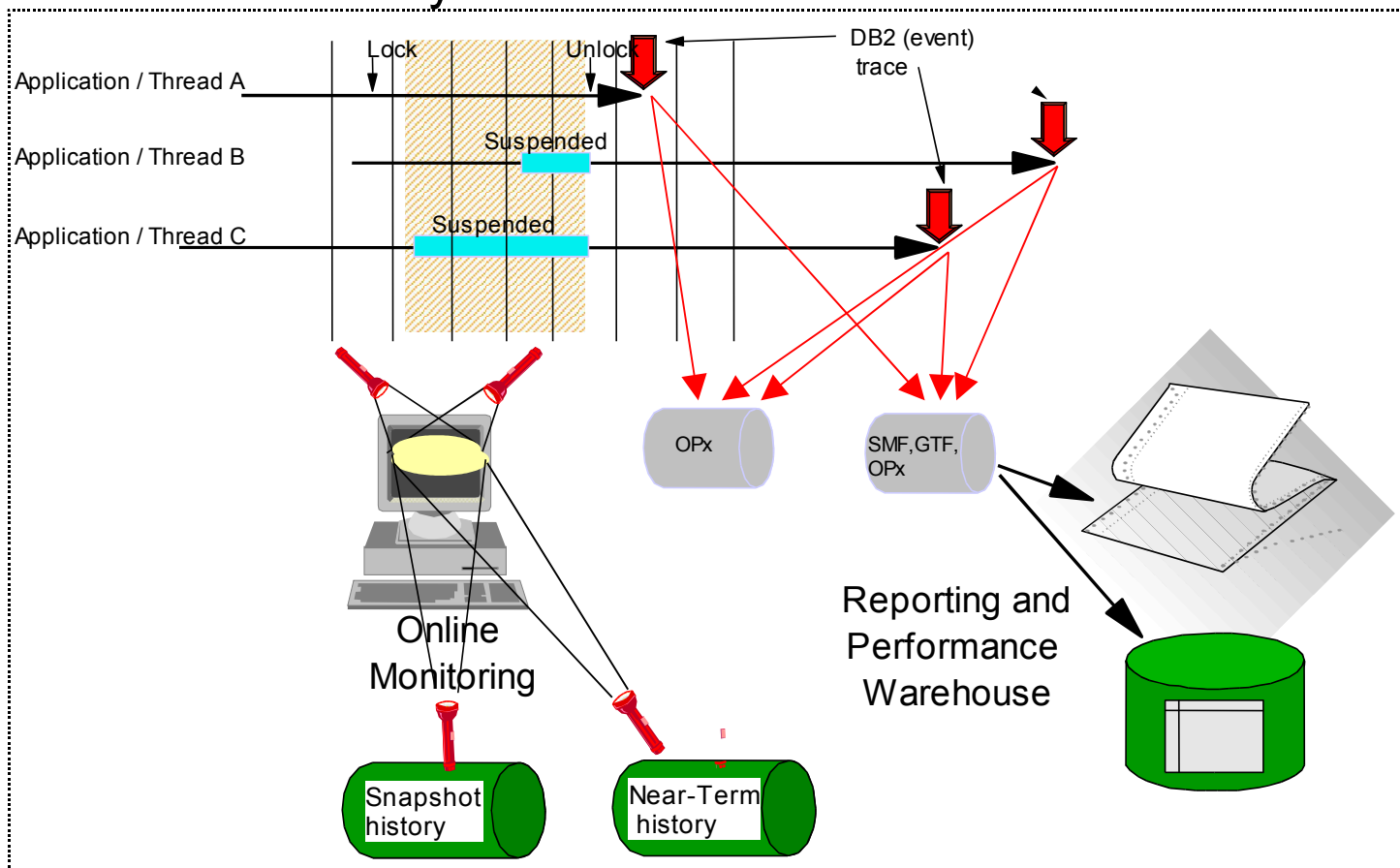
- Short range history (minutes, hours, days)
- Near-term / Short-term / Snapshot
- Collects or summarizes information from IFI
- Interval and amount / type of data are customizable
- Uses a history dataset with a wrap-around mechanism
- Online user interfaces only

■ Long-term History

- Long range history (days, weeks, months)
- Usually SMF records
- Batch Reporting and online interfaces
- Performance Warehouse

History

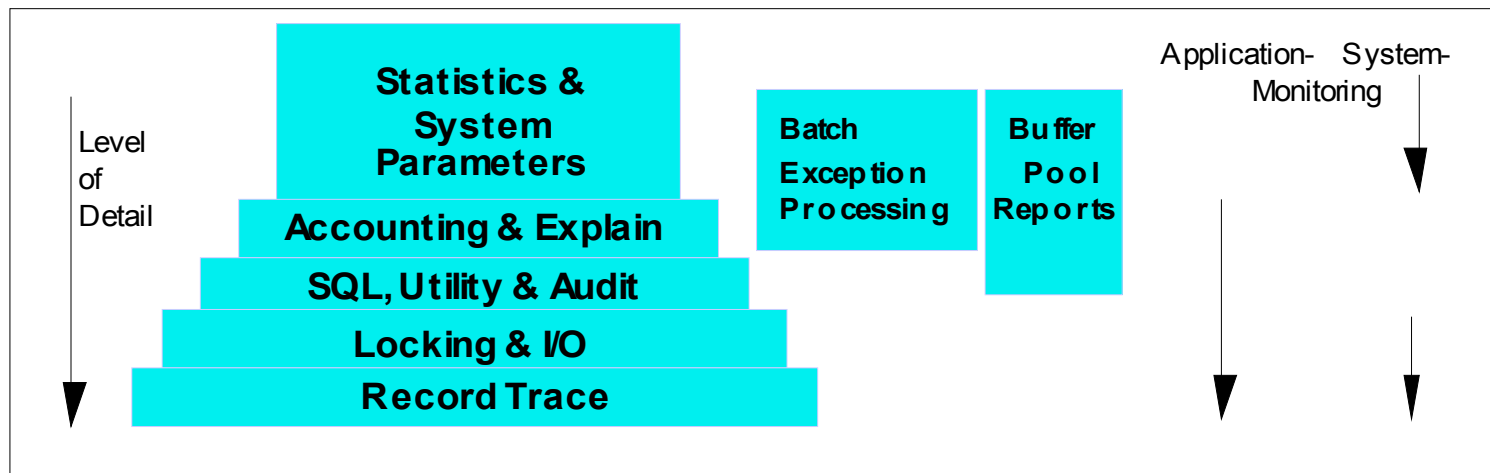
- Near-term history- Online monitor (3270 classic) } Based on DB2 (event) traces
- Long-term history- Reports, Performance DB } Based on DB2 snapshot data
- Snapshot history- Online Monitor (PE,ISPF) } Collected and saved by TEMS
- Short-Term history- TEP GUI } or TEMA



Batch Reporting

Report facility that

- Takes SMF, GTF or TSO data sets (collected by DB2 Performance Expert Collect Report Data) as input
- Generates a variety of customizable reports and traces:



Invocation

- Online or via MVS JCL (Interactive Report Facility or manually)
- or via workstation GUI (Statistics & Accounting Report)
 - Result shown in browser window
- Integrated into Online monitoring (SQL activity tracing)

Reduction of trace information for loading into the Performance DB

Performance Warehouse

Functions

- An fully automated warehouse for accounting and statistic information
- Can contain raw and summarized data from multiple DB2 subsystems
- Performance Database is built, controlled and maintained by OM Server
- PWH Client (PC based GUI) allows the collection of data from DB2, define ETL process and generate Reports for it
- Tasks can be scheduled or executed on demand
- Predefined SQL Queries allow to evaluate performance data
- Rules-of-thumb check for potential problems or tuning ways

Performance Warehouse Client

- Java front-end for PWH
- Running under Windows
- Integrated into Performance Expert Client
- Requires DB2 Connect

Input Data

- Pre-processed data from Report Facility
- OPx data collected via CRD
- GTF data
- SMF data

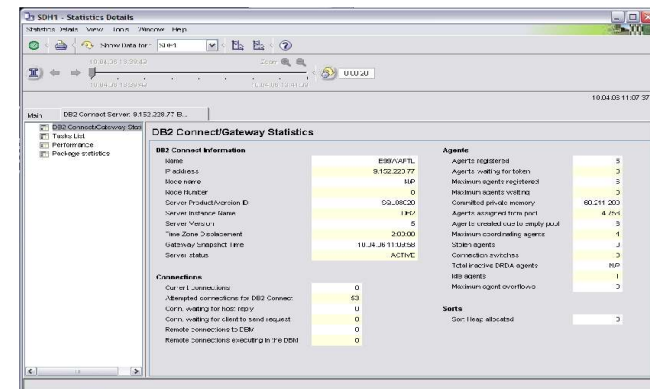
DB2 Connect Monitoring

Functions

- Allows to monitor DB2 Connect gateways connected to a DB2 on z/OS or LUW (end-to-end monitoring)
- Fully integrated into Classic Interface, Tivoli Enterprise Portal and PE Client
- Shows DB2 Connect activity either from the perspective of the gateway or from the DB2 host
- Information about DB2 threads on the host are fully correlated with information about the thread on the DB2 Connect gateway
- Performance between gateway and host is regularly measured to inform immediately about problems
- Allows tuning of DB2 Connect gateway but also problem determination

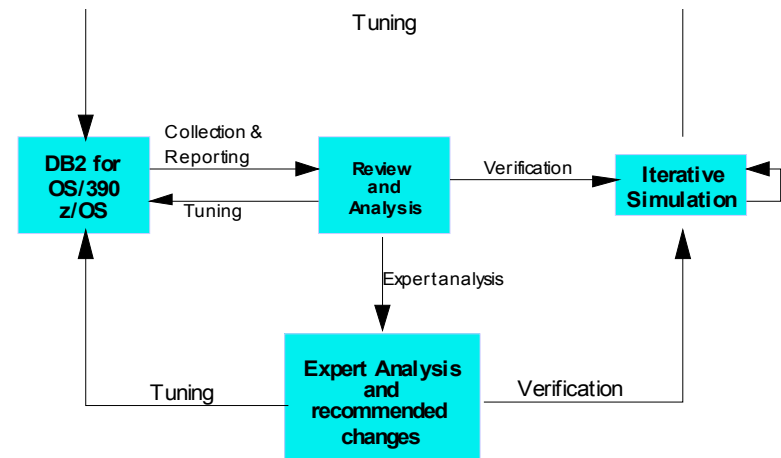
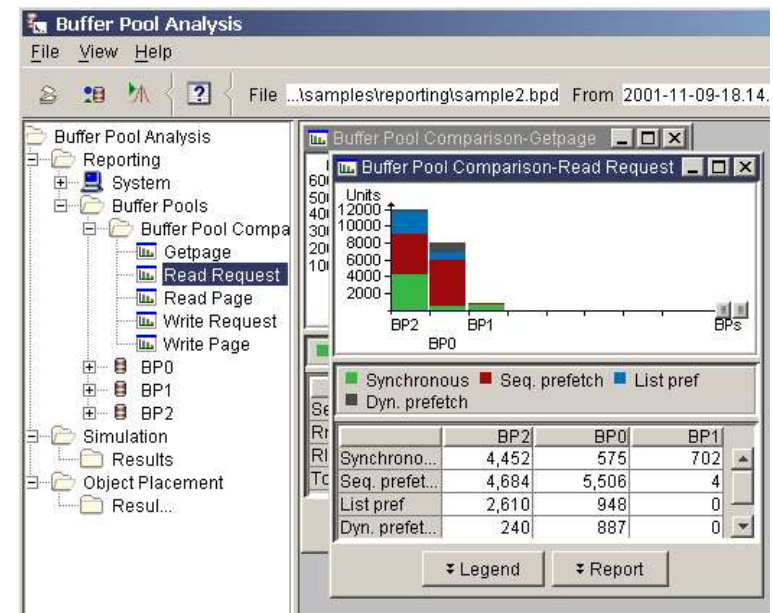
Show Information

- Network between DB2 client and gateway
- Network between DB2 gateway and host
- System utilization of gateway machine
- DB2 Connect configuration
- DB2 Connect utilization
- Connected DB2 Clients
- Performance of connection to DB2 host



Buffer Pool Analysis

- **Collects** buffer pool data
 - as summary or detailed data
 - continuously or in sampling mode
 - in Online and Batch
- Generates various **reports and displays** results in multiple formats for BP and GBP (including graphical end-user interface)
- Provides expert knowledge and recommendations
- Recommends **object placements, BP size & thresholds**
- Generates **ALTER statements** for the recommendation
- Provides **simulation** for planned changes
- Makes it easy to tune your buffer pools



User Interfaces

ISPF Online Monitor

PE Client

3270 Classic

CUA

Web based monitor suite for DB2 health checking and IT-wide monitoring (CICS, IMS, Websphere, etc.)

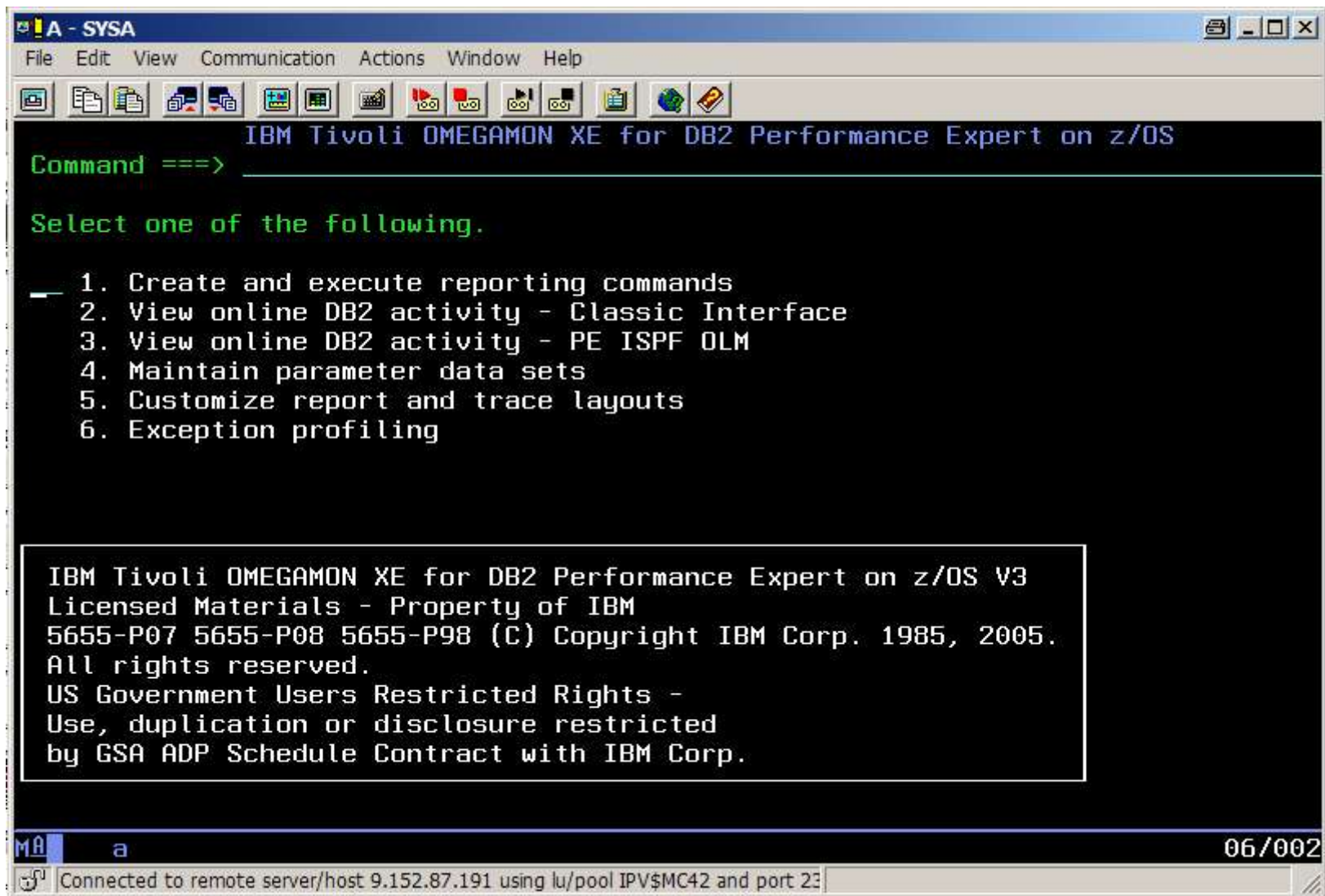
Tivoli Enterprise Portal

Full detailed, fast responding DB2 monitor

Response Times	Status	Alerts
Trans.	CPU	Pools
DB2 Connect Server - SQL Statement Time		
DB2 Connect Server - Network Connection		

DB2 Connect Information		Times for Sample SQL Statement	
Name	IP Address	Total Response Time	Elapsed Time
B99FF013	9.152.96.28	00:00:00.013	00:00:00.000

ISPF Dialog



PE Client

Monitored
Objects pane

Group DB2
subsystems in
user-defined
views under
'My Folders'

Logging on:
• From Server
Status pane
• From
Monitored
Objects pane
• From Selected
Subsystem
pane
• From menu bar
• Indicated by
green ring

DB2 Performance Expert - System Overview

Monitor Selected View Tools Window Help

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Monitored Objects

- All DB2 Systems
 - Z/OS
 - Subsystems
 - DBDM
 - Data Sharing Group
 - ISC710P1
 - ISC3
 - My Folders

ISC3

- DB2 Commands
- ThreadSummary
- Statistics Details
- System Health
- Threads in Lock Conflicts
- Locking Conflicts
- System Parameters
- Trace
- Performance Warehouse - Report
- Performance Warehouse - Analysis
- Performance Warehouse - Expert

To log on to this DB2 system, open the [Logon](#) window.
To log on to one or more DB2 systems, open the [Multiple Logon](#) window.

Multiple logon:
For multiple subsystems
where the user id and
password are the same

Top 20 Event Exceptions

Server Sta...	Logon	DB2 Syste...	Group	User ID	Exception	Trace Stat...	Session	Operating ...	System N...	DB2
↑	×	DBDM		DMGZJ	N/A	N/A	0	ZOS	MV81	V7
↑	×	ISC3	ISC710P1	JONESGT	N/A	N/A	0	ZOS	MV50	V7

Exception
Event pane

Selected Subsystem
pane.
Launch PE tasks from
here by double-
clicking,
or from the menu bar

PE Server
Status pane

PE Client - Real-time Data and Snapshot History

The screenshot displays the PE Client interface with the following components:

- Monitored Objects:** A tree view on the left showing the hierarchy: All DB2 Systems > z/OS > Subsystems > DB8G > DSNC.
- DSNC - Statistics Details:** A window showing statistics for the DSNC database. It includes a timeline for snapshot history from 3/8/07 7:02:58 AM to 3/8/07 7:26:58 AM, with a zoom control and a 0:00:20 timer.
- Dynamic SQL Statements:** A list of SQL statements in the left pane, including SQL Activity DML, Dynamic SQL Statements, and SQL Statements.
- EDM Pool:** A section showing pool statistics and a pie chart for page distribution.
- SQL Cache Statistics:** A table of statistics for the SQL cache.

Annotations with red arrows point to specific features:

- Snapshot history control:** Points to the timeline and zoom controls in the DSNC - Statistics Details window.
- View Dynamic SQL statements:** Points to the SQL Statements list in the left pane.
- View SQL cache statistics:** Points to the SQL Cache Statistics table.

Statistic	Value
CT requests	7,554
CT not in EDM pool	140
CT hit ratio (%)	98.1
PT requests	5,575,348
PT not in EDM pool	1,735
PT hit ratio (%)	100.0
Pages for Dynamic SQL Cache	1,492
Pages in EDM pool dataspace	110,595
Free pages in dataspace free chain	109,103
Failures due to dataspace full	0

Statistic	Value
Held by SKPTS	3,751
Held by PTS	584
Free Pages	30,674
Pages in use (%)	13.3
Non stealable pages in use (%)	1.88
Failures due to EDM pool full	0

Page distribution in EDM pool

3270 Classic - Thread Snapshot

```

Session A - [43 x 80]
File Edit View Communication Actions Window Help

ZTDITL VTM 02 V540./C D711 11/30/04 18:56:45 2
> Help PF1 Back PF3

THREAD INFORMATION: Enter a selection letter on the top line.

> *-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS D-LOCKS OWNED E-GLOBAL LOCKS
> F-CURRENT SQL G-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGES L-RES LIMIT M-PARALLEL TASKS N-UTILITY O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY S-APPL TRACE T-ENCLAVE
> U-LONG NAMES

=====
> THREAD DETAIL
=====
PLAN
+ Thread: Plan=DISTSERV Connid=SERVER Corrid=DB2BP.EXE Authid=JEN
+ Dist : Type=DATABASE ACCESS, Luwid=G998C451.D404.041130172153=31
+ Location : PM01D711 ,Host Name=dyn-9-152-196-81.boeblingen.de.ibm.
act
+ Thread Activity
+ DB2 Status = WAIT-REMREQ TCB Time (SQL) = 00:00:00.000
+ MVS Status = Wait for TCB Time = 00:00:00.000
+ Total Elapsed Time = 00:33:20.189 Elapsed Time = 00:00:00.000
+ CPU Utilization = 00.0% Elapsed Time (SQL) = 00:00:00.000
+ Total CPU Time = 00:00:00.000
+ Total Parallel Tasks =
+ Current Parallel Tasks=
+ Stored Procedures
+ Total CPU = 00:
+ Elapsed time = 00:
+ Elapsed Time (SQL) = 00:
+ Wait for TCB Time = 00:
+ Wait Event Count =
+ Curr Wait TCB Time = 00:
+ SavePoints
+ Savepoint Requests =
+ Release Savepoints =
+ Rollback Savepoints =
+ In-DB2 Times
MA a
Connected to remote server/host tn3270.de.ibm.com using lu/pool FU
  
```

Horizontal navigation within thread detail (*)

Fields in exception are highlighted

```

Session A - [43 x 80]
File Edit View Communication Actions Window Help

ZSQL VTM 02 V540./C D711 11/30/04 18:58:10 2
> Help PF1 Back PF3

THREAD INFORMATION: Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS D-LOCKS OWNED E-GLOBAL LOCKS
> *-CURRENT SQL G-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGES L-RES LIMIT M-PARALLEL TASKS N-UTILITY O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY S-APPL TRACE T-ENCLAVE
> U-LONG NAMES

=====
> SQL CALL BEING EXECUTED
=====
PLAN
+ Thread: Plan=DISTSERV Connid=SERVER Corrid=DB2BP.EXE Authid=JEN
+ Dist : Type=DATABASE ACCESS, Luwid=G998C451.D404.041130172153=31
+ Location : PM01D711 ,Host Name=dyn-9-152-196-81.boeblingen.de.ibm.
call
+ SQL call is active, call information is as follows :
+ Thread Status = WAIT-REMREQ SQL Request Type = DYNAMIC
+ Total SQL Reqs = 374 SQL Call Type = FETCH
+ SQL DBRM Name = SQLC2E03 SQL Statement Number = 00210
+ Collection ID = NULLID
+ select * from sysibm.systables
=====
  
```

Tivoli Enterprise Portal (Web Browser)

Easy to use
Browser controls

Plug and Play components

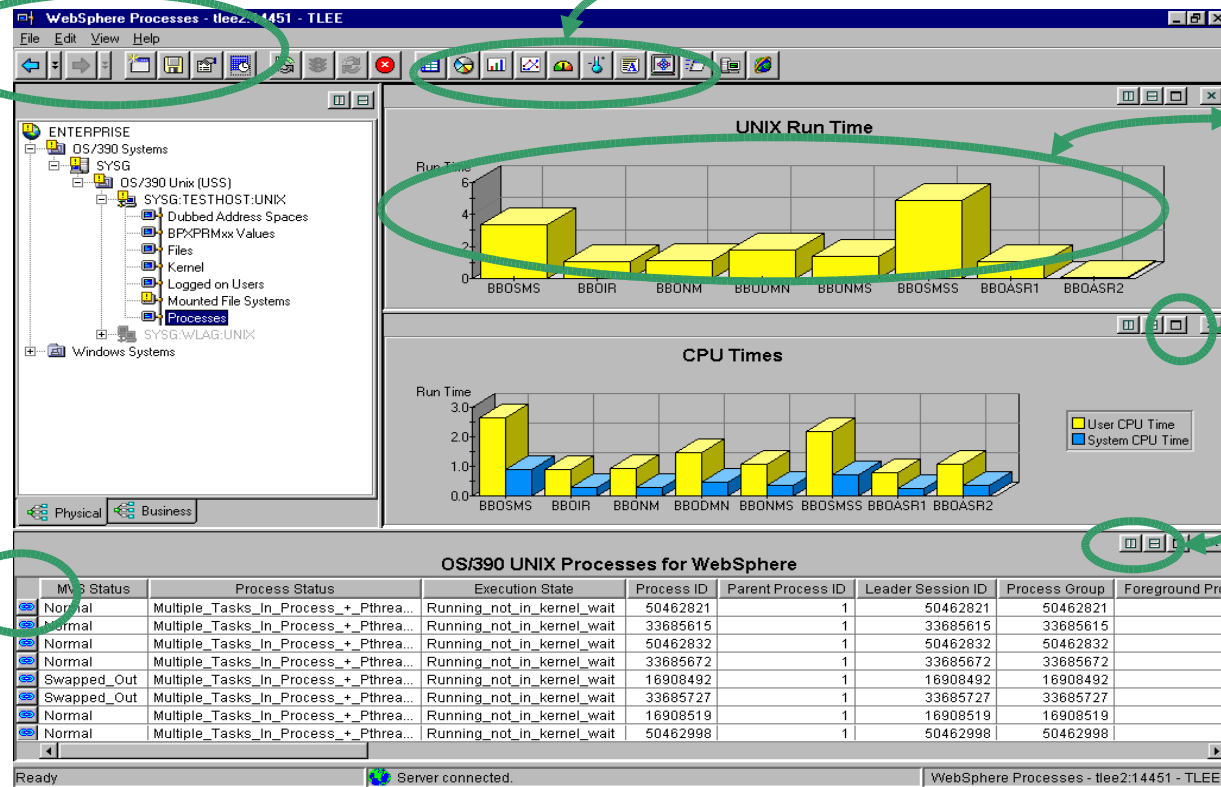
Personalized
Views

View
Zoom

Splitter
controls

Intelligent
Linking

Persistent customized
workspaces



TEP - Thread Detail

Welcome DNET581 **Tivoli Enterprise Portal** Log out IBM

File Edit View Help

View: Physical

Physical

- DSNA:MVSA:DB2
- DSNB:MVSA:DB2
- DSNC:MVSA:DB2
 - Thread Activity details
 - System Status
 - Detailed Thread Exception
 - Lock Conflicts
 - Subsystem Management
 - Log Manager
 - Utility Jobs
 - EDM Pool
 - Buffer Pool Management
 - Volume Activity

Thread ID

Plan	Correlation ID	Connection ID	Authorization (Unicode)	Connection Type	End User ID	Job Name	AGNT ASID	Package DBRM (Unicode)
ADHPLAN3		RRSAF	AEAGENT	RRSAF		DB2AEB	457	ADHAAELR

In-DB2 Times

In DB2 Elapsed Time	In DB2 CP CPU Time	In DB2 IIP CPU	In DB2 SP CPU
05:50:47.179	09:43:40.350	00:00:00.000	00:00:00.000

Triggers

Trigger CPU Not Enclave	Trigger Elapsed Not Enclave	Trigger CPU In Enclave	Trigger Elapsed In Enclave
00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000

Thread Activity

Status	Elapsed Time	CP CPU Time	MVS Status	CP CPU Rate	Parallel Tasks	Active Tasks
NOT-IN-DB2	00:35:20.000	04:51:52.014	WAIT-MISC	0.0	0	0

User Defined Functions

In UDF Time	UDF TCB Wait Time	UDF Wait Time	UDF Elapsed Time	UDF SQL Elapsed Time	UDF SQL Events
00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	0

Stored Procedures

SP CPU	SP Elapsed Time	SP SQL Elapsed Time	SP Schedule Wait Time Current	SP Schedule Wait Time	SP

SavePoints

Savepoints	Release Savepoints	Rollback Savepoints
0	0	0

Tivoli Enterprise Portal (TEP) example



Information On Demand

Trace Data

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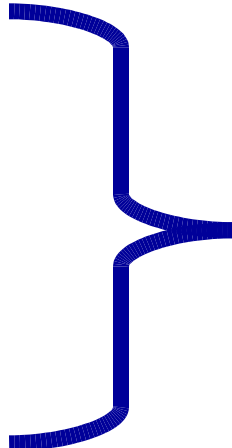
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Trace Data Topics

- Trace Data Fundamentals
- Statistics Traces
- Accounting Traces
- Performance Traces

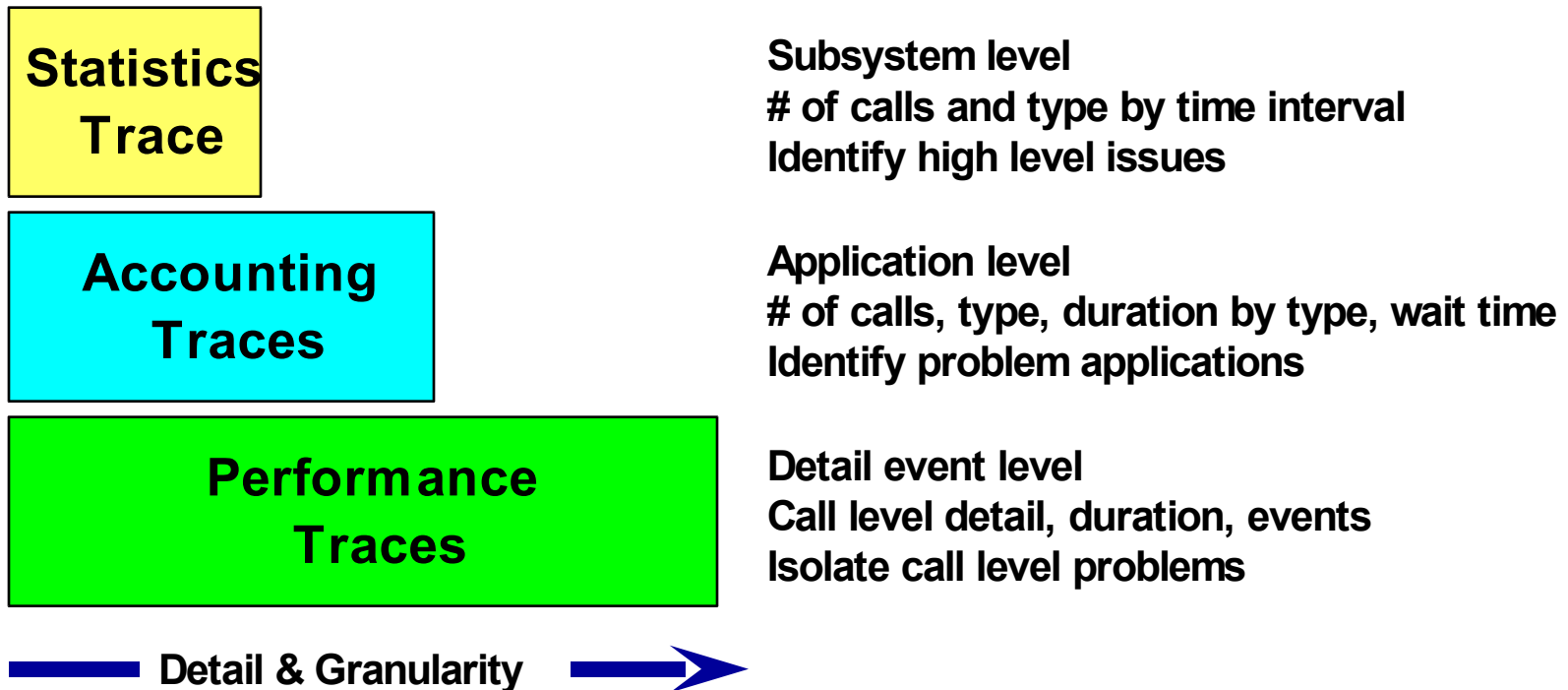
Types of Trace Data

- Statistics
 - DB2 subsystem-wide DB2 measurements
- Accounting
 - Application execution measurements
- Performance
 - Measurements of specific events
- Monitor
 - Trace data for program access (IFI interface)
- Audit
 - Record security and access events
- Global
 - IBM support use



Use these
For performance
analysis

Trace Data Granularity



- Corresponding trace types gather varying levels of detail and information
- More detailed traces may (most likely will) result in additional trace overhead

Trace Overhead

- DB2 Accounting Class 1 and 3 and Statistics Traces
 - Total cost of about 2 percent to 5
- Accounting Class 2 may add 2 to 5 percent
 - Dependent upon DB2 application
- Audit Trace
 - Typically less than 5 percent
- Performance Trace
 - Very Dependent upon trace classes and IFCIDs started
 - Overhead anywhere from 20 percent to 100 percent

Trace Architecture

- Each trace record type has a specified format and ID (the IFCID)
 - IFCID = Instrumentation Facility ID
- Traces may be activated
 - Automatically at DB2 startup
 - Manually by the DB2 START TRACE command
- Trace destinations
 - SMF- History facility for all subsystems on z/OS
 - GTF - Generalized Trace Facility
 - OPx - Online destination used by monitoring tools
 - SRV - Serviceability

Trace Documentation

- Traces are numbered and well documented
- Library SDSNIVPD member DSNWMSGs contains descriptions of all trace IFCIDs
- Download and print this member out

Example of DSNWMSGs

```

_____ IFCID 0001 _____
(RMID 26)
DB2 STATISTICS RECORD.
DB2 WRITES STATISTICS DATA AS SMF TYPE 100 RECORDS
(SUBTYPE 0).
FOR SYSTEM SERVICE STATISTICS AND DATABASE STATISTICS:
IFCID 1 IS FOR SYSTEM SERVICES STATISTICS.
IFCID 2 IS FOR DATABASE STATISTICS.
BOTH ARE WRITTEN ON A REGULAR TIME INTERVAL AS SPECIFIED
WITH INSTALL PARAMETER STATISTICS TIME, PANEL DSNTIPN.
MOST COUNTS IN THESE RECORDS ARE ACCUMULATED
SINCE DB2 WAS LAST STARTED. HENCE, THE NUMBERS
INCLUDE COUNTS PRIOR TO THE REPORT PERIOD COVERED.
VALUES ARE RESET TO ZERO ONLY WHEN DB2 IS STARTED.
FIELDS IN THIS RECORD ARE GROUPED BY SECTIONS AND
ARE PRESENTED IN THE FOLLOWING ORDER:
SECTION QWS00PSO IS MAPPED BY DSNDQWHS, AND OPTIONALLY BY
    DSNDQWHC, DSHDQWHT, DSNDQWHU, DSNDQWHD, DSNDQWHA
SECTION QWS00R10 (ADDRESS SPACE DATA) IS MAPPED BY
    DSNDQWSA.
SECTION QWS00R20 (INSTRUMENTATION DESTINATION DATA) IS
    MAPPED BY DSNDQWSB.
SECTION QWS00R30 (INSTRUMENTATION DATA) IS MAPPED BY
    DSNDQWSC.
SECTION QWS00R40 (SUBSYSTEM SERVICES DATA) IS MAPPED BY
    DSNDQ3ST.
SECTION QWS00R50 (COMMAND DATA) IS MAPPED BY DSNDQ9ST.
SECTION QWS00R60 (IFC CHECK POINT DATA) IS MAPPED BY
    DSNDQWSD.
SECTION QWS00R70 (LATCH MANAGER DATA) IS MAPPED BY
    DSNDQVLS.
SECTION QWS00R80 (AGENT SERVICES DATA) IS MAPPED BY
    DSNDQVAS.

```

```

SECTION QWS00R90 (STORAGE MANAGER DATA) IS MAPPED BY
    DSNDQSST.

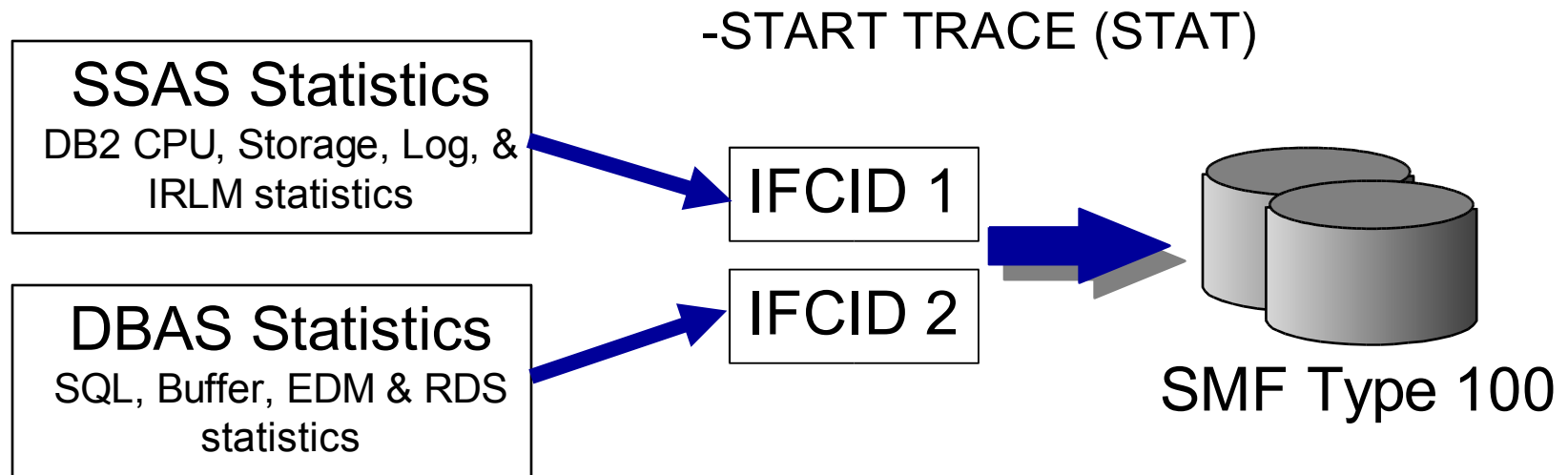
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```

SECTION QWS00RAO (LOG MANAGER DATA) IS MAPPED BY
    DSNDQIST

```

Statistics Traces



- System-wide performance data gathered at specified intervals (set in DSNZPARM)
- Written to SMF with type 100 header
 - Two IFCIDs written per period
- Overhead small (approximately 1%)

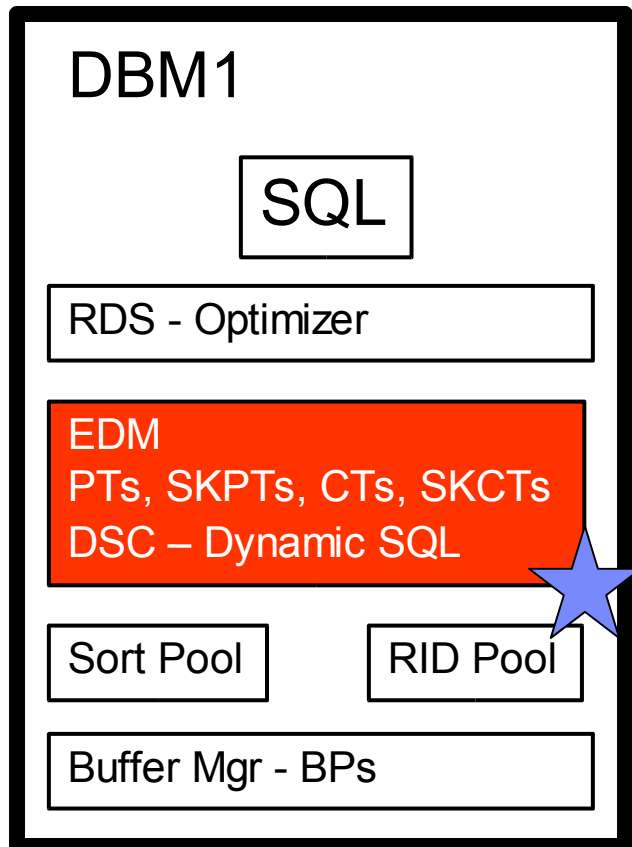
Statistics Counters

- Values can be
 - An accumulated value since the DB2 system was last started
 - For example, the total number of SELECT statements that were executed since the system was last started
 - A current or snapshot value
 - For example, the number of open data sets at the time the DB2 Statistics records pair was externalized
 - A maximum or high water mark value the counter has reached since the time DB2 was last started
 - For example, the maximum number of open data sets at any time since the system was last started.

Using Statistics Data

- Statistics data provides information on the nature and activity of the DB2 workload at the subsystem level
 - How busy is the system
 - Number of getpages, threads or SQL statements
 - What is the nature of the workload
 - Static vs. dynamic SQL
 - Stored Procedure, UDF and Trigger activity
 - Parallelism
- Look for problem indicators and unusual counts
 - Thread queuing
 - Poor pool performance
 - EDM, BP, Sort, RID pools
 - Lock escalation, deadlocks, timeouts
 - High numbers of Aborts

EDM Pool Analysis

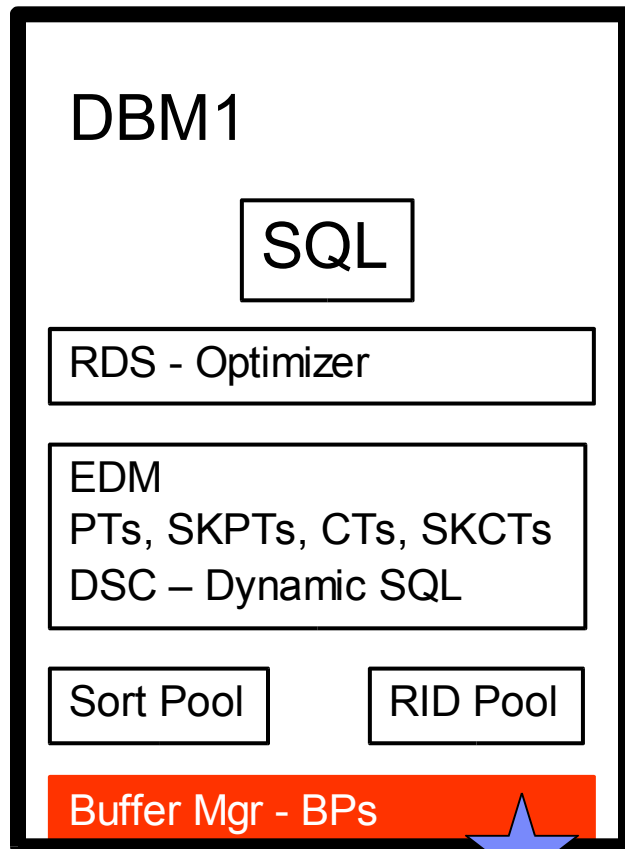


- Is The EDM Pool Sized Appropriately?
 - Pages in EDM pool & percent in use
 - Failures due to pool full
- How Is The EDM Pool Being Used?
 - Page usage counts by type (CT, PT, SKCT, SKPT, DBD, Cache)
- What Is The EDM Pool 'Hit ratio'?
 - Number of requests, Number of requests not found in pool
- Is Dynamic SQL Cache Being used Effectively?
 - Inserts, Requests, Cache size
 - Calculate 'Hit' ratio

EDM Pool Analysis

- Monitor EDM Pool statistics for
 - FAILS DUE TO POOL FULL
 - REQ NOT FOUND IN EDMPOOL
 - PREP_STMT_HIT_RATIO
- Tune EDM pool size
 - Bind option ACQUIRE USE
 - Bind option RELEASE COMMIT for all but most frequently executed plans and packages
 - Reduce DBD size with REORG and MODIFY if many dropped tables in segmented table spaces

Buffer Pool Analysis



- Are Buffer Manager thresholds being reached?
 - Examples - DWTH, DMTH, SPTH
- Is the BP Sized appropriately?
 - Paging for Read or Write
 - Number of currently active buffers
- What Is the BP Hit Ratio?
 - Synchronous Reads, Pages dRead via Prefetch, Getpages

$$\text{Hit Ratio} = \frac{\text{Getpages} - (\text{Sync I/Os} + \text{Pages read via Prefetch})}{\text{Getpages}}$$



Buffer Pool Analysis

■ Critical Counters

- Prefetch Disabled - No Buffer
 - Minimize to zero by increasing BP size
- Data Manager Critical Threshold
 - Minimize to zero by increasing BP size
- Page-In for Read / Write
 - Check MVS paging - if short on central storage reduce BP size
- Synch Reads
 - Minimize if possible by increasing BP size

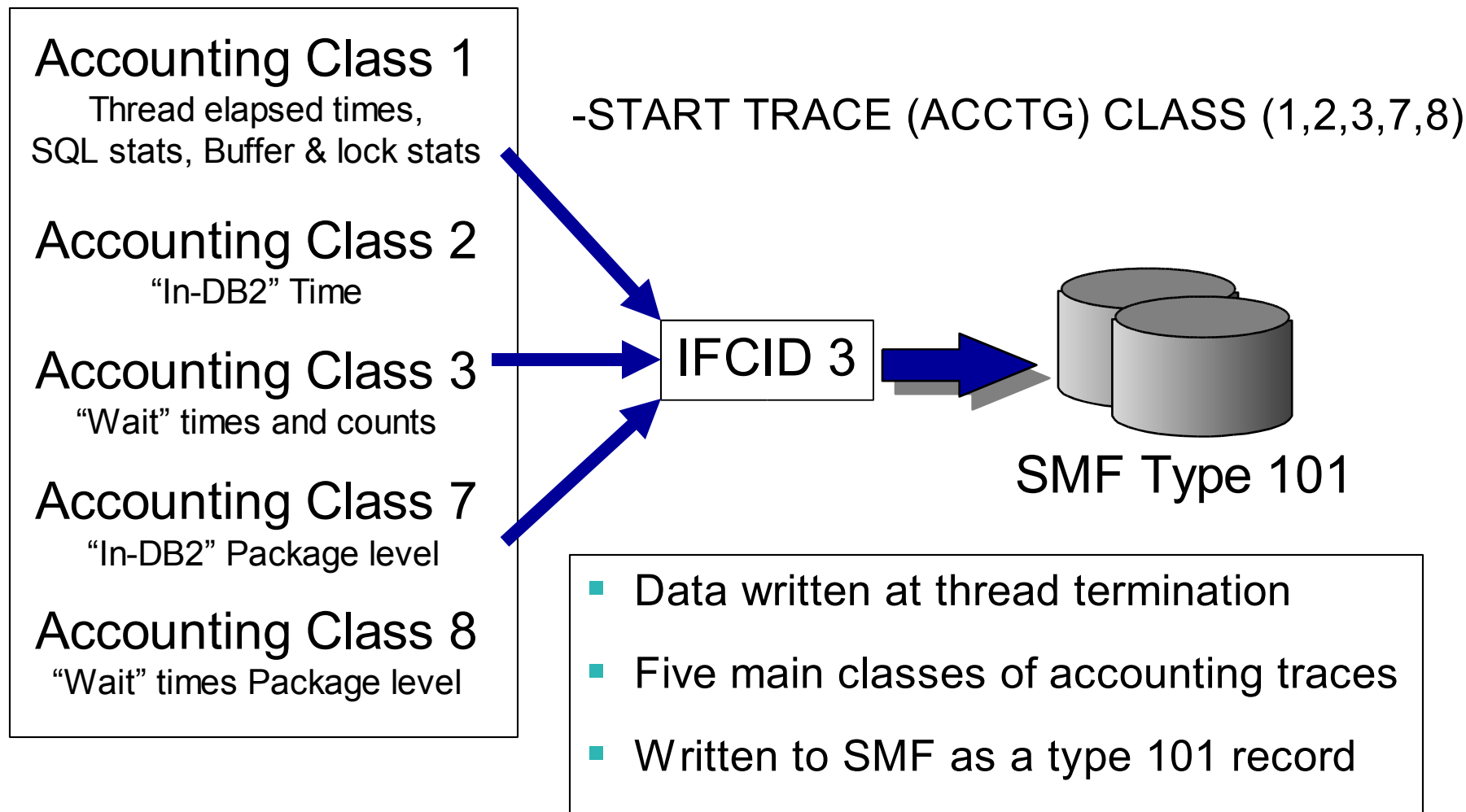
Lock Performance

- Is There Lock Contention?
 - Timeout & Deadlock counts
 - IRLM Latch Contention
- Is There An Increase In Lock Activity?
 - Lock Requests & Unlock Requests
 - Lock Escalation
 - Are There Data Sharing Lock Activity Issues?
- Lock & Unlock requests
 - IRLM & XES contention
 - False contention

Checkpoint and Log Performance

- Checkpoint activity
 - Number of checkpoints taken
- Potential Logging Bottlenecks?
 - Waits caused by unavailable output buffer
 - Number of log Control Intervals created - calculate rate
- Is There Backout Activity?
 - Reads from Output Buffer
 - Reads from Active Log
 - Reads from Archive Log

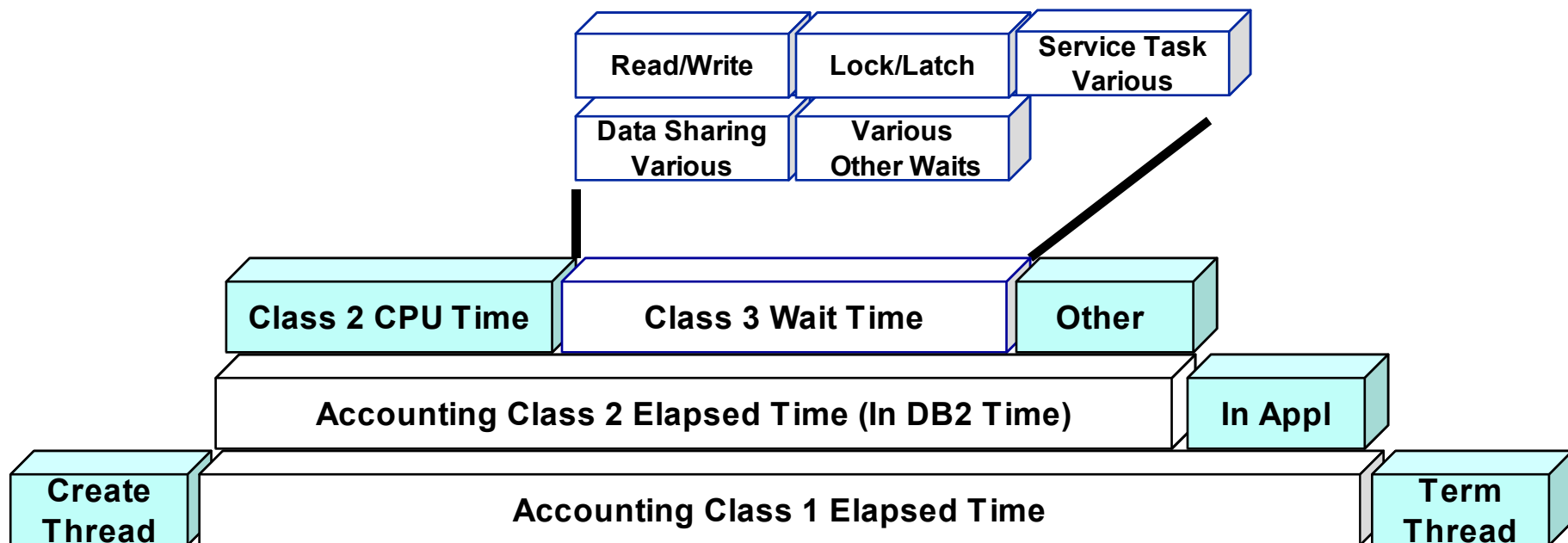
Accounting Traces



Using Accounting Data

- Review accounting data to understand what the applications are doing
 - Number of SQL calls, type of SQL calls, duration of SQL In-DB2 activity, dynamic SQL activity
 - DB2 SQL waits - I/O and lock/latch waits
 - Stored Procedure activity, number of procedure calls and elapsed and In-DB2 times, SP scheduling delays
 - Package level detail
- Accounting traces are the starting point for DB2 application and database performance analysis

Using Accounting Data



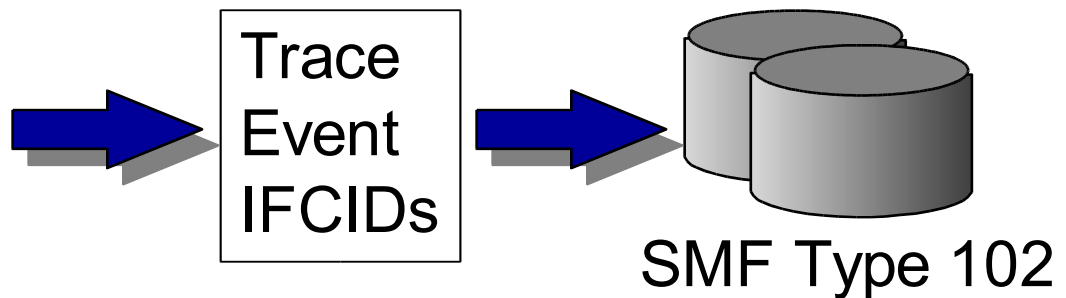
- Accounting traces provide a wealth of information at the application level
 - Elapsed time, CPU time, and wait time for DB2 applications
 - Wait counts and times (I/O, locks, latches, etc)
 - Scan information, Buffer information, SQL counts
- Use application trace data to determine application time line

Performance Traces

Example Trace Classes

Class 1 - Background Events
Class 2 - Subsystem Events
Class 3 - SQL Events
Class 4 - Buffer & EDM
Class 5 - Log Manager
Class 6 - Lock Summary Info
Class 7 - Lock Detail Info
Class 8 - Data Mgr Detail
Class 9 - Sort Detail
Class 10 - Bind Commands Utilities
Class 11 - Dispatching
Class 12 - Storage Mgr
Class 13 - Edit & Validation Exits
Class 14 - In & Out of DB2
Class 15 - Installation Defined
Class 16 - To/from other Locations
Class 17 - Drain/Claim Detail
Class 20 - Data Sharing Summary
Class 21 - Data Sharing Detail
Class 22 - Authorization Exit
Class 23 - Language Env ...

-START TRACE (PERFM) CLASS (3)



- Detailed traces of DB2 events
- Each Trace Class consists of multiple event types (IFCIDs)
- Many events may be traced
- Written to SMF as type 102

Using Performance Traces

- Accounting Traces can isolate performance issues down to the plan / dbrm / package level
- Use Performance Traces to isolate further
 - Statement level
 - Detail activity within the statement level
- The most detailed level of tracing activity
 - Performance Trace IFCIDs of events within each class (1 to 334)
 - Many are IFCID pairs (Begin and End event)
- Use judiciously and with caution
 - Understand what is being traced
 - Trace only what is needed to isolate the problem
 - Filter by Plan, Authid, Class, or Location
 - Use the IFCID option to specify IFCIDs in addition to class specified
 - Use Class 30-32 to specify only selected IFCIDs

Performance Trace Overhead

- Low Overhead
 - Class 1 Background Events, Class 2 Subsystem Events, Class 3 SQL Events, Class 10 Utilities & Commands
- Medium Overhead
 - Class 6 Lock Summary, Class 8 Data Mgr scans
- High Overhead
 - Class 4 Buffer Mgr, Class 5 Log Mgr, Class 9 Sort activity
- Very High Overhead
 - Class 7 Lock Detail, Class 13 Edit & Validation



Information On Demand

Tuning Methodology

IBM Software Group



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Tuning Methodology Topics

- Where Is The Problem?
- DB2 CPU Problems
- DB2 I/O Problems
- Other Wait Problems
- More Details

Tuning Methodology

- Establish Service Level Agreements
- Routine collection and review of DB2 performance data
- Create and maintain historical performance data for trend analysis
 - Specific exception events
 - Event monitoring
 - Timeouts or deadlocks
 - EDM Pool full
 - Authorization failures
 - Thresholds exceeded
 - Elapsed, CPU, or wait times
 - Getpages and buffer updates

Is it Really a DB2 Problem?

Compare Total Task Elapsed Time Versus Accounting Class 1 Elapsed Time

Total Task Elapsed - Total time of a Batch Job or Total CICS/IMS response time

Class 1 Elapsed - First SQL call until thread termination

If A Large Difference Consider:

Application design and logic
Inefficient application initialization
Enqueue prior to DB2 thread creation

Poor CICS or IMS scheduling performance

Is it Really a DB2 Problem?

Compare Accounting Class 1 Elapsed to Accounting Class 2 In-DB2 Time

Class 1 Elapsed - First SQL call until thread termination

Class 2 In-DB2 - Time a task spent INSIDE DB2

If A Large Difference Consider:

**Application design and logic
Inefficient application code (outside DB2)
Enqueue of resources outside of DB2
Poor CICS or IMS performance
Non-DB2 processing of rows retrieved
Application & end user think time
Thread wait for reuse time**

**Look
Outside DB2**

What if Class 2 Time is Relatively Large?

High Accounting Class 2 In-DB2 Time

Class 2 In-DB2 - Time a task spent INSIDE DB2

If Relatively High Consider:

- Number and type of SQL calls being performed
- Poor SQL coding technique
- Poor index usage
- High DB2 Getpage counts
- Large DB2 scans and high I/O counts
- DB2 Lock/latch delays
- Large DB2 sorts
- Too many columns returned by SQL

**Look
Inside DB2**

What is the Breakdown of Class 2 Time?

Compare Class 2 In-DB2 Time Relative To Class 2 In-DB2 CPU Time

Class 2 In-DB2 - Time a task spent **INSIDE** DB2

Class 2 In-DB2 CPU Time - CPU Time a task spent **INSIDE** DB2 doing SQL etc.

If CPU A High Percentage Consider:

Poor SQL coding technique
Number and type of SQL calls being performed
Large amount of dynamic SQL
Number of columns returned by SQL
Unnecessary rows retrieved by SQL
EDITPROC and FIELDPROC processing
Large Sorts
Too frequent commits
Excessive locking

**Look
Inside DB2**

Application CPU Tuning

- Minimize the number of SQL calls
 - SELECT is more efficient than OPEN, FETCH, CLOSE if only retrieving one row
- Filter unnecessary rows by adding predicates
 - More efficient than using program logic
- Use DB2 column functions versus program logic
- Minimize number of columns retrieved, updated, or inserted
- Minimize number of rows searched
- Use Static SQL versus Dynamic SQL
 - Example - SQLJ (static) versus JDBC (dynamic)

Is DB2 Waiting for Something?

Compare Class 2 In-DB2 Time Relative To Class 2 In-DB2 CPU Time

Class 2 In-DB2 - Time a task spent **INSIDE** DB2

Class 2 In-DB2 CPU Time - CPU Time a task spent **INSIDE** DB2 doing SQL etc.

If A Large Difference Consider:

Various possible delays

DB2 measured (Class 3) delays

Poor index usage

High DB2 Getpage counts

Large DB2 scans and high I/O counts

DB2 Lock/latch delays

Large DB2 sorts

Unaccounted for delays

**Look
Inside DB2**

DB2 Wait Counters

Compare Class 2 In-DB2 Time Versus Class 3 Wait Times

Class 2 In-DB2 - Time a task spent **INSIDE** DB2

Class 3 Wait Times - Time DB2 spent waiting for various events

Review Class 3 Wait Counters:

I/O Wait Time counters

Lock/Latch Wait Time counters

Service Task Wait Time counters

and others...

**Look
Inside DB2**

High I/O Wait Counters

High Synchronous I/O Wait Time

High Asynchronous I/O Wait Time

High I/O Wait Time Consider:

Poor SQL coding technique

Poor index usage

High DB2 Getpage counts

Large DB2 scans and high I/O counts

Large DB2 sorts

DASD and I/O contention

Poor Virtual Pool performance and sizing

I/O Wait Time Tuning

- Application I/O tuning
 - Review SQL and perform SQL optimization
 - Reduce number of pages of data accessed
- Eliminate System related I/O problems
 - DASD service times and DASD contention
 - Buffer Pool tuning issues (size, number, hit ratio)
- Database design
 - Review Index design, number of Indexes and Index placement

High Lock / Latch Wait Counters

High Accounting Class 3 Lock/Latch Wait Time

High Lock/Latch Wait Time Consider:

- Needlessly large number of locks taken**
- Locks being held for a long duration**
- Lock escalation**
- Commits too infrequently**
- Lock timeouts and deadlocks**
- Mix of concurrent applications**
- Sequence in which applications update**

Lock / Latch Wait Time Tuning

- Lock / Latch Contention implies concurrency and the mix of applications being executed
- Review application BIND options
- Is Lock Avoidance being exploited?
- Can UR be employed?
 - Remove locking overhead

Is There Unaccounted Time?

***Compare Class 2 In-DB2 Time Versus
The Sum of Class 3 Wait Time and Class 2 CPU Time***

Class 2 In-DB2 - Time a task spent INSIDE DB2

Class 3 Wait Times - Time DB2 spent waiting for various events

Class 2 In-DB2 CPU Time - CPU Time a task spent INSIDE DB2 doing SQL etc.

If A Large Difference Consider:

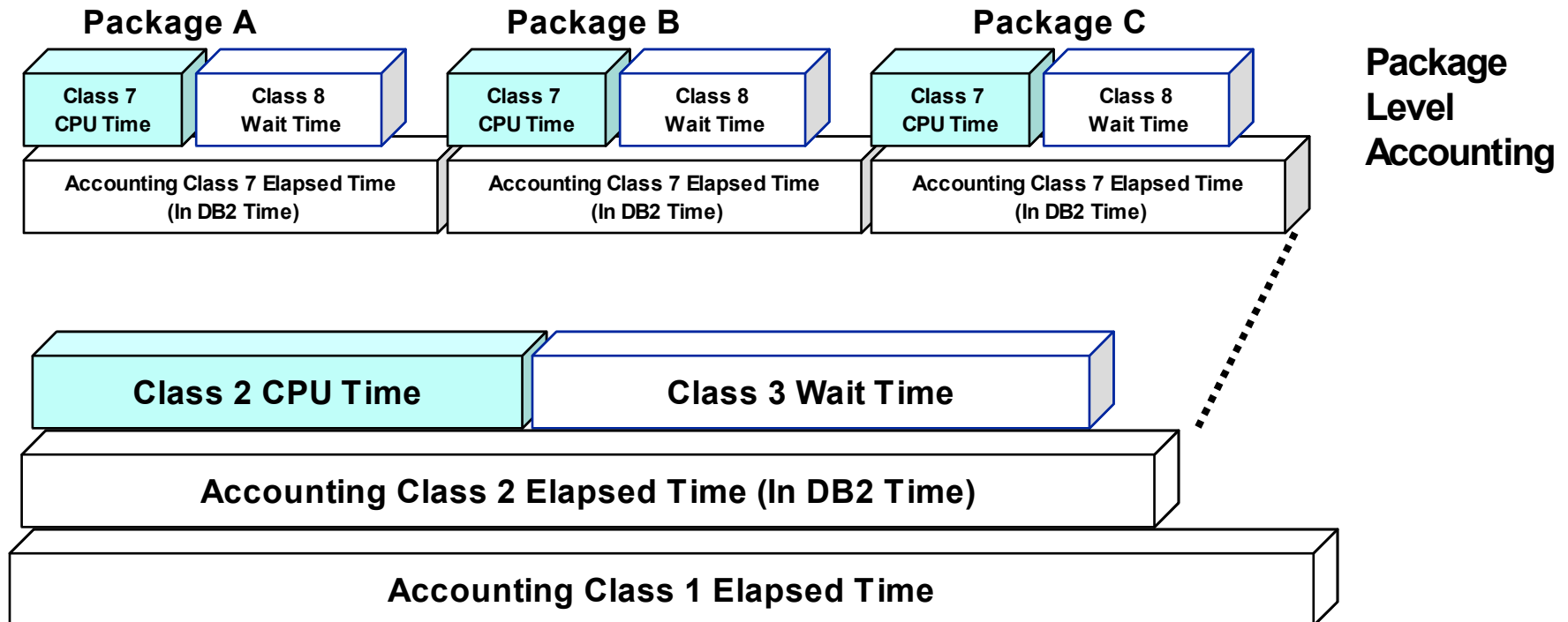
MVS dispatching priority

MVS paging delays

Operating system delays impacting DB2...

**Look
Outside DB2**

Is More Detail Needed?



- Accounting Class 7 & 8 provide package level detail
- SPs, UDFs, and triggers are all packages

Is Even More Detail Needed?

- Use Performance Traces to isolate further
 - Statement level
 - Detail activity within the statement level
- The most detailed level of tracing activity
- Use judiciously and with caution
 - Understand what is being traced
 - Trace only what is needed to isolate the problem
- Consider application flow
 - Is it a statement that is executed once but gets a million rows?
 - Is it a statement that is gets only one row, but is executed a million times?
- Find the offending SQL statement and perform DB2 Explain analysis

Tuning Summary

- Leverage your efforts - make the easy to implement changes first
 - Tune the z/OS environment
 - Workload management (WLM) policy
 - I/O subsystem
 - Change the data design
 - Create views
 - Add / remove / modify indexes
 - Modify application code
 - Tune SQL calls
 - Implement data purge / archive

- DB2 v8 Administration Guide SC18-7413
 - Part 5 Performance Monitoring and Tuning



Information On Demand

Real-Time Monitoring with the OMPE 3270 Classic Interface

IBM Software Group



ON DEMAND BUSINESS™

Advantages

- Fast and Flexible
 - Easy to use the interface once trained on navigation
 - Get almost instantaneous response times due to the direct VTAM connection
- Reliable
 - Only dependent on a direct connection to OMPE server
- Full range of online capabilities
 - Real time monitoring
 - Object analysis
 - Near term history
 - Application Trace Facility
 - DB2 Connect
 - Monitoring of locking contention
 - IFCID tracking

Sample Panel

Session A - [24 x 80]

File Edit View Communication Actions Window Help

Panel ID Profile

PF11 for more detail

Commands

Cursor

```

ZALLT VTS 02 V310 /C DSN06/01/06 12:25:53 2
> Help PF1 Back PF3 Up PF7 Down PF8 Sort PF10 Zoom PF11
> T.A
> THREAD ACTIVITY: Enter a selection letter on the top line.
> * -ALL B-TSO C-CICS D-IMS E-BACKGROUND F-DIST ALLIED G-DIST DBAC
> H-UTIL I-INACT J-FILTER K-FUNCTIONS L-STORED PROC M-TRIGGERS N-SYSPLEX
> O-ENCLAVES
=====
> ALL THREADS CONNECTED TO DB2
THDA
+ *
+ Elapsed Planname CPU Status GetPg Update Commit Jobname
+ -----
+ 04-21:21 ABP1PLAN 00.0% SWAPPED-OUT 286 52 24 ABPABP1
+ 04-21:19 K02PLAN 00.0% NOT-IN-DB2 18556 98 4 CXEGA03
+ 04-21:19 DB2PM 00.0% NOT-IN-DB2 6090K 2238K 489747 CXEGA03
+ 04-21:17 K02PLAN 00.0% NOT-IN-DB2 0 0 0 CXEGA03
+ 04-21:06 K02PLAN 00.0% NOT-IN-DB2 0 0 0 CXEGA03
+ 01-03:31 K02PLAN 00.0% NOT-IN-DB2 142 0 1 CXEGA03
+ 03:10:21.2 K02PLAN 00.0% NOT-IN-DB2 0 0 0 CXEGA03
+ 01:49:28.1 K02PLAN 00.0% NOT-IN-DB2 0 0 0 CXEGA03
+ 00:01:39.5 DISTSERV 00.0% IN-DB2 12 0 6 JAVA.EXE
=====

```

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00036 and port 23

Major and Minor Commands

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZPKG      VTS      02      V310./C DSN 06/01/06 12:31:14  2
> Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11

>      THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED    I-BUFFER POOL  J-GROUP BP
> *-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY      O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
> U-LONG NAMES
=====
>                                THREAD PACKAGE SUMMARY
PLAN
+ Thread:  Plan=ABP1PLAN  Connid=DB2CALL  Corrid=ABPABP1      Authid=SYSSTC
+ Attach:  BATCH          JOB Name=ABPABP1      JOB Asid= 172
+ Package: ABPRSLOG      Collection=
pkl

pkg
+
+ Package/      SQL      In-DB2      In-DB2      In-DB2
+ DBRM          Requests  Elapsed Time  CPU Time    Waits      Wait Time
+ -----
+ ABPRDB2S      0          N/A          N/A          N/A          N/A

```

Major Command

Minor Command

Major and Minor Commands

- Major Commands
 - Displayed in uppercase
 - A major command preceded by a blank can be used on any panel to return information related to the command
 - Some major commands must be followed by a parameter
- Minor Commands
 - Displayed in lowercase
 - Cannot be used alone
 - Can only be used on panels with the major commands

Summary of DB2 Activity - Statistics Data

- Critical system wide activity and resource utilization
 - Main Menu option S
- Collected by collection type – IMS, CICS, TSO, Batch, Utilities, Distributed, and Stored Procedures
- Summary of activities grouped by subsystems connected to DB2
- Rates are calculated from the last OMPE display
- All values are based on active threads
- Highlighted fields represent exceptions (red)
- ZOOM (PF11) is active for this panel
 - Place cursor on the connection type and press PF11

Each time you press ENTER your screen is refreshed

Summary of DB2 Activity - Statistics Data

Session A - [24 x 80]

File Edit View Communication Actions Window Help

_____ ZSUMM VTS 02 V310./I DSNC 06/07/06 12:52:48 2

> Help PF1 Back PF3 Zoom PF11

> S.

=====

> SUMMARY OF DB2 ACTIVITY

DSYS

+ SSAS+DBAS+IRLM+DIST CPU =	00.0%	Thread Commit Rate =	1.2/sec
+ Create Thread Rate =	.0/sec	Thread Signon Rate =	.0/sec
+ Synch Read I/O Rate =	.0/sec	Prefetch Req Rate =	3.4/sec
+ Update Request Rate =	9.4/sec	Write I/O Rate =	.0/sec
+ Getpages/Read I/O =	.00	Pages/Write I/O =	.00
+ Current Lock Suspensions =	0	Locking Timeouts =	0
+ Locking Deadlocks =	0	Locking Escalations =	0

+

Connection Type	Connections	Threads	CPU	Getpage Rate	Elapsed Time
-----	-----	-----	-----	-----	-----
+ IMS	0	0	00.0%	.0/sec	00:00:00.0
+ CICS	0	0	00.0%	.0/sec	00:00:00.0
+ TSO Foreground	0	0	00.0%	.0/sec	00:00:00.0
+ Batch	1	6	00.1%	.0/sec	05:07:39.8
+ Utilities	0	0	00.0%	.0/sec	00:00:00.0
+ Distributed	1	3	00.0%	.0/sec	01:04:22.5
+ Stored Procedures	1	0	00.0%	.0/sec	00:00:00.0

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00067 and p

System Level
information

1 line system level
summary

Active connections and threads
CPU rate %
Total GETPAGE rate / second
Avg. Elapse time for active threads

Thread Activity - Accounting Data

- Information on ALL connected threads
 - Main Menu option T - by plan (Accounting classes 1,2,3)
 - Main Menu option U - by package (Accounting classes 7,8)
- Each row displays information about an individual thread
 - Filtering available
- Columns are ordered by thread elapsed time
- Includes information about
 - DB2 and MVS resource consumption
 - DB2 activity
- Place cursor on any thread - PF11 (ZOOM) to display Thread Detail

Thread Summary Activity - Accounting Data

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZALLT      VTS      02      V310./I DSNCR 06/07/06 15:19:25  2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
> T.A
>
      THREAD ACTIVITY:  Enter a selection letter on the top line.

> *-ALL  B-TSO  C-CICS  D-IMS      E-BACKGROUND  F-DIST ALLIED  G-DIST DBAC
> H-UTIL  I-INACT J-FILTER K-FUNCTIONS L-STORED PROC M-TRIGGERS  N-SYSPLEX
> O-ENCLAVES
=====
>
      ALL THREADS CONNECTED TO DB2
THDA
+ *
+ Elapsed      Planname  CPU      Status      GetPg      Update      Commit      Jobname
+ -----
+ 08:22:21.6    K02PLAN  00.0%    NOT-IN-DB2    19868      72          3    CXEGA03
+ 08:22:19.1    DB2PM    00.0%    NOT-IN-DB2    699300     278664     34866    CXEGA03
+ 08:21:41.2    K02PLAN  00.0%    NOT-IN-DB2      0          0          0    CXEGA03
+ 08:21:06.3    K02PLAN  00.0%    NOT-IN-DB2      0          0          0    CXEGA03
+ 08:01:20.2    K02PLAN  00.0%    NOT-IN-DB2    142        0          1    CXEGA03
+ 03:56:49.9    K02PLAN  00.0%    NOT-IN-DB2      0          0          0    CXEGA03
+ 00:01:09.3    DISTSERV 00.0%    IN-DB2        0          0          0    JAVA.EXE
+ 00:00:01.5    DISTSERV 00.0%    IN-DB2        2          0          1    JAVA
+ 00:00:01.2    DISTSERV 00.0%    IN-DB2        2          0          1    JAVA

```

Look at the GETPG counts and thread elapsed time to determine high activity threads

Put cursor on thread - PF11 to get to Thread Detail

Commands

The screenshot shows a DB2 command window with the following content:

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
[Icons]

_____ ZTDTL      VTS      02      V310./I DSNC 06/07/06 15:20:39  2
> Help PF1                                           Back PF3

>          THREAD INFORMATION:  Enter a selection letter on the top line.

> *-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED     I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS  N-UTILITY    O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY    S-APPL TRACE  T-ENCLAVE
> U-LONG NAMES
=====
>
                                THREAD DETAIL
PLAN
+ Thread:  Plan=DB2PM          Connid=DB2CALL  Corrid=CXEGA03      Authid=DB2PM
+ Attach:  BATCH              JOB  Name=CXEGA03          JOB Asid= 301
+ Package: DGO@PC1           Collection=DB2PM
act
+ Thread Activity                                     User Defined Functions
+ -----
+ DB2 Status          =      NOT-IN-DB2      TCB Time (SQL)          = 00:00:00.000
+ MVS Status          =      WAIT-MISC      Wait for TCB Time       = 00:00:00.000
+ Total Elapsed Time  =    08:23:33.729      Elapsed Time            = 00:00:00.000
+ CPU Utilization     =           00.0%      Elapsed Time (SQL)      = 00:00:00.000
. . . . .

```

A green box with the text "ands" is overlaid on the left side of the screenshot, partially obscuring the command window's left edge.

Thread Detail Activity - Accounting Data

Session A - [24 x 80]

File Edit View Communication Actions Window Help

TOTAL time is the total In-DB2 time that has elapsed

CPU is total CPU time accumulated for the thread

CURRENT is the amount of In-DB2 time that has elapsed executing the current event

ZTDTL VTS 02 V310./I DSN 06/12/06 12:35:53 42			
+ In-DB2 Times			
		Total	Current
+ Elapsed Time 00:04:43.932 00:00:00.000			
+ CPU Time 00:07:33.082 00:03:46.541			
+ Stored Procedure CPU Time 00:00:00.000 00:00:00.000			
+ Waits			
	Count	Total	Current
+ Synchronous I/O Wait 0 00:00:00.000 00:00:00.000			
+ Asynchronous Read I/O Wait 0 00:00:00.000 00:00:00.000			
+ Asynchronous Write I/O Wait 0 00:00:00.000 00:00:00.000			
+ Local Lock/Latch Wait 237 00:00:00.136 00:00:00.000			
+ Page Latch Wait 0 00:00:00.000 00:00:00.000			
+ Drain Lock Wait 0 00:00:00.000 00:00:00.000			
+ Drain of Claims Wait 0 00:00:00.000 00:00:00.000			
+ Archive Log Mode(Quiesce) Wait 0 00:00:00.000 00:00:00.000			
+ Archive Read from Tape Wait 0 00:00:00.000 00:00:00.000			
+ Switch to Open/Close Wait 0 00:00:00.000 00:00:00.000			
+ Switch to SYSLOGNG Service Wait 0 00:00:00.000 00:00:00.000			
+ Switch to DMS Waits 0 00:00:00.000 00:00:00.000			
+ Other Service Waits 2 00:00:00.002 00:00:00.000			
+ Force at Commit Waits 0 00:00:00.000 00:00:00.000			

In-DB2 times requires Accounting Class 2

Wait times requires Accounting Class 3

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00084 and port 23

Thread Detail Activity - SQL Counts (G)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZTSCNT VTS 02 V310./I DSNC 06/07/06 15:21:56 2
> Help PF1 Back PF3

> THREAD INFORMATION: Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS D-LOCKS OWNED E-GLOBAL LOCKS
> F-CURRENT SQL *-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGES L-RES LIMIT M-PARALLEL TASKS N-UTILITY O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY S-APPL TRACE T-ENCLAVE
> U-LONG NAMES
=====
> CURRENT SQL COUNTS
PLAN
+ Thread: Plan=DB2PM Connid=DB2CALL Corrid=CXEGA03 Authid=DB2PM
+ Attach: BATCH JOB Name=CXEGA03 JOB Asid= 301
+ Package: DGO@PC1 Collection=DB2PM
sqls
+ Commit = 35048 Abort = 0 Select = 25051
+ Open Cursor = 55013 Close Cursor = 55013 Fetch = 80018
+ Insert = 0 Delete = 1 Update = 5003
+ Describe = 0 Lock Table = 0 Prepare = 0
+ Grant = 0 Revoke = 0 Set Rules = 0
+ Increm Bind = 0 Label/Comm On = 0 Set SQLID = 230078
. . . . .

```

Helps identify which activities are using resources excessively

Thread Detail Activity - Locks Owned (D)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZLOCKO VTS 02 V310./I DSN 06/07/06 15:22:47 2
> Help PF1 Back PF3 Up PF7 Down PF8

> THREAD INFORMATION: Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS *-LOCKS OWNED E-GLOBAL LOCKS
> F-CURRENT SQL G-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGES L-RES LIMIT M-PARALLEL TASKS N-UTILITY O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY S-APPL TRACE T-ENCLAVE
> U-LONG NAMES
=====
> LOCKS/CLAIMS OWNED BY A THREAD
PLAN
+ Thread: Plan=DB2PM Connid=DB2CALL Corrid=CXEGA03 Authid=DB2PM
+ Attach: BATCH JOB Name=CXEGA03 JOB Asid= 301
+ Package: DGO@PC1 Collection=DB2PM
own
+ Lock Ownership Information
+ Percent NUMLKUS = .00 Total Locks Owned = 1
+ Total Catalog Locks = 0 Pageset and Dataset Locks = 0
+ Catalog Pageset Locks = 0 Page/Row Locks = 0
+ Catalog Page/Row Locks = 0 Directory and Other Locks = 1
+ Bind ACQUIRE option = USE Bind RELEASE option = COMMIT
  
```

Use PF1 to display information such as lock types

Identifies the thread

Determine if you are using the correct bind parameters

Counts of the types of threads being held

Can access additional Lock information: Lock counts, Lock waits, Global Locks

Thread Detail Activity - Lock Counts (B)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZTLOCT VTS 02 V310./I DSNC 06/12/06 13:58:22 5

> A-THREAD DETAIL *-LOCK COUNTS C-LOCK WAITS D-LOCKS OWNED E-GLOBAL LOCKS
> F-CURRENT SQL G-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGES L-RES LIMIT M-PARALLEL TASKS N-UTILITY O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY S-APPL TRACE T-ENCLAVE
> U-LONG NAMES
=====
> THREAD LOCK/CLAIM/DRAIN ACTIVITY
PLAN
+ Thread: Plan=DB2PM Connid=DB2CALL Corrid=CXEGA03 Authid=DB2PM
+ Attach: BATCH JOB Name=CXEGA03 JOB Asid= 287
+ Package: DGO@PC1 Collection=DB2PM
lock
+ Lock Requests = 693941 Deadlocks Detected = 0
+ Unlock Requests = 231333 Timeouts Detected = 0
+ Query Requests = 0 Suspends - Lock Only = 0
+ Change Requests = 28914 Suspends - Latch Only = 221
+ Other IRLM Requests = 0 Suspends - Other = 0
+ Escalations to Shared = 0 Escalations to Exclusive = 0
+ Maximum Page/Row Locks = 2
+
+ Claim Requests = 130115 Claims Failed = 0
+ Drain Requests = 0 Drains Failed = 0

```

Use option O to see objects

Deadlock / Timeout

Escalations

Drain - action to acquire a locked resource by quiescing access to the object
 Claim - informs that the object is being accessed; no other object can be drained until a commit is reached

Thread Detail Activity - Objects (O)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZTOBJ   VTS   02       V310./I DSN 06/08/06 16:43:23   2
> Help PF1                                     Back PF3

>          THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED     I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS  N-UTILITY    *-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
> U-LONG NAMES
=====
>                                OBJECTS USED BY THREAD
>
> PLAN
+ Thread:  Plan=DB2PM          Connid=DB2CALL  Corrid=CXEGA03      Authid=DB2PM
+ Attach:  BATCH              JOB Name=CXEGA03      JOB Asid= 304
+ Package: DGO@PC1           Collection=DB2PM
tobj
+
+ Database  Spacenam  Dsn  Volume  Getpage  Sync  Prefetch I/O
+ -----  -
+ DB2PM     IXP1J76   001   390     0         Seq   List   Dynamic
+ DB2PM     IXP1VYX   001   650     0
+ DB2PM     PROCESS   001  2080    0
+ DSNDB06   SYSEBCDC   001   520     0

```

Database	Spacenam	Dsn	Volume	Getpage	Sync Read	Seq	List	Dynamic
DB2PM	IXP1J76	001		390	0	0	0	0
DB2PM	IXP1VYX	001		650	0	0	0	0
DB2PM	PROCESS	001		2080	0	0	0	0
DSNDB06	SYSEBCDC	001		520	0	0	0	0

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

Thread Detail Activity - Current SQL (F)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZSQL      VTS      02      V310./I DSNCL 06/12/06 14:13:44  2
> Help PF1                                           Back PF3

>      THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> *-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED    I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY    O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE  T-ENCLAVE
> U-LONG NAMES
=====
>                                SQL CALL BEING EXECUTED
PLAN
+ Thread: Plan=ABP1PLAN Connid=DB2CALL Corrid=ABPABP1      Authid=SYSSTC
+ Attach: BATCH          JOB Name=ABPABP1                 JOB Asid= 171
+ Package: ABPRSLOG      Collection=
call
+      SQL call is active, call information is as follows :
+
+ Thread Status = NOT-IN-DB2      SQL Request Type  = STATIC
+ Total SQL Reqs =      53        SQL Call Type    = INSERT
+ SQL DBRM Name  = ABPRSLOG      SQL Statement Number = 00388
=====

```

Thread status

Request type (dynamic / static)

Activity being performed

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Thread Detail Activity - Buffer Pool (I)

Information about Buffer Manager activity at the pool level for an individual thread

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

ZBUF      VTS      02      V310./I DSN 06/12/06 14:21:13 2
PF1      Back PF3      Up PF7      Down PF8

>      THREAD INFORMATION: Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED    *-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY      O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
> U-LONG NAMES
=====
>
>      THREAD BUFFER POOL ACTIVITY
PLAN
+ Thread: Plan=ABP1PLAN Connid=DB2CALL Corrid=ABPABP1 Authid=SYSSTC
+ Attach: BATCH      JOB Name=ABPABP1      JOB Asid= 171
+ Package: ABPRSLOG   Collection=
buf
+ Buffer Pool ALL
+
+ Getpage Requests      =      398  Failed Getpage Requests      =      0
+ Synchronous Read I/O  =      73   Getpage/Read I/O          =      5.45
+ Page Updates          =     104   Seq Prefetch Requests     =      2
+ List Prefetch Requests =      0   Dynamic Prefetch Requests =     11
+ Prefetch Pages Read   =     106   Prefetch Pages In Hiperpool=      0
  
```

Note Getpage counts and synchronous I/O vs. Prefetch requests

Lock Escalation

- Occurs typically in batch jobs that have heavy update activity and commit infrequency
 - DSNZPARM parameters
 - NUMLKTS - default value for max # page / row locks a thread can hold on a single table space
 - Used when TS is defined with LOCKMAX=SYSTEM
 - When limit is reached - escalates to single tablespace lock (unless tablespace is defined with LOCKMAX=0)
 - NUMLKUS - total # page / row locks across all tablespaces that a thread can hold (typical value is 20000)
 - -904 when limit is reached
 - Batch job abends
 - Lock escalation is preferable to -904

How can you see the values?
From the main menu R.H.F

DSNZPARM Settings

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZPRLM   VTS   02       V310./I DSN 06/14/06 20:13:01  2
>      Help PF1                                     Back PF3
> R.H.F
>      DSNZPARM INFORMATION:  Enter a selection letter on the top line.

>  A-THREAD   B-TRACE   C-LOGGING   D-ARCHIVING   E-AUTH/RLF/DDF   *-IRLM
>  G-STORAGE   H-DATASET   I-DDCS   J-DATA SHARING   K-STORED PROC
=====
>
>      DSNZPARM IRLM PARAMETERS
>      DSNZ
+ DSNZPARM Module = DSNZPARM           Assembly Date = 05/25/06
+ Initial Module = DSNZPARM           Assembly Date = 05/25/06
+ Previous Module = DSNZPARM          Assembly Date = 05/25/06

prlm
+ Max/Tablespace (NUMLKTS) = 1000      IRLM Proc (IRLMPROC) = DSNCIRLM
+ Max/User (NUMLKUS) = 10000          IRLM Subsys (IRLMSID) = KRLM
+ Timeout Interval (IRLMRW) = 60      Auto Start Wait (IRLMSWT) = 300
+ Auto Start IRLM (IRLMAUT) = YES     Utility Timeout (UTIMOUT) = 6
+ Number Local/Global Cycles = 0      Wait Time Local Deadlock = 1000
+ MVS Lock Table Hash Entry= 0        IRLM Maximum CSA Usage = 0
+ PC Yes Specified = YES              Pending Number Hash Entries = 0
+ Timeout Interval = 0
=====

```

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Lock Escalation

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZLOCKO  VTS    02      V310./I DSN 06/14/06 20:32:56  2
> Help PF1          Back PF3          Up PF7          Down PF8

>      THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS  *-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL  G-SQL COUNTS  H-DISTRIBUTED  I-BUFFER POOL  J-GROUP BP
> K-PACKAGES     L-RES LIMIT   M-PARALLEL TASKS N-UTILITY    O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY  S-APPL TRACE  T-ENCLAVE
> U-LONG NAMES
=====
>      LOCKS/CLAIMS OWNED BY A THREAD
PLAN
+ Thread: Plan=DSNREXX  Connid=DB2CALL  Corrid=DBA104R  Authid=DBA104
+ Attach: BATCH        JOB Name=DBA104R  JOB Asid= 190
+ Package: DPTADD      Collection=SSEMMWL
own
+      Lock Ownership Information
+
+   Percent NUMLKUS   = .00      Total Locks Owned      = 44
+   Total Catalog Locks = 2      Pageset and Dataset Locks = 9
+   Catalog Pageset Locks = 2    Page/Row Locks      = 0
+   Catalog Page/Row Locks= 0    Directory and Other Locks = 33
+   Bind ACQUIRE option = USE    Bind RELEASE option   = COMMIT
+   ISOLATION option    = Cursor Stability

```

MA a

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Lock Escalation

Session A - [24 x 80]

File Edit View Communication Actions Window Help

ZLOCKO VTS 02 V310./I DSN06/14/06 20:35:43 25

Type	Level	Resource	Number
DPAG	X	DB=SSEMMWL PS=GLWS002	1
DTBS	S	DB=DSNRGFDB	1
	S	DB=DSNDB07	1
PSET	IS	DB=DSNDB06 PS=SYSSEQ	1
	IX	DB=TEMPDB PS=TEMPTS	1
	S	DB=DSNRGFDB PS=DSNRGFTS	1
	IX	DB=SSEMMWL PS=GLWS002	1
	S	DB=DSNDB07 PS=DSN4K01	1
SKCT	S	Plan=DSNREXX	1
PALK	IS	DB=SSEMMWL PS=GLWSEMP	4
MDEL	S	DB=SSEMMWL PS=GLWSEMP	1
TABL	IS	DB=DSNDB06 PS=SYSSEQ	1
	IS	DB=DSNRGFDB PS=DSNRGFTS	1
	IS	DB=DSNRGFDB PS=DSNRGFTS	1
	IX	DB=SSEMMWL PS=GLWS002	1
SKPT	S	Coll=QEMNT6UXV D Pkg=QSS7IEVE	1
		Token=179B1B7F010832EC	1
	S	Coll=T!MEST!WS Pkg=AESUAQT7	1
		Token=17BFB72605EECA33	1
	S	Coll=T!MEST!WS Pkg=ASTDIAS6	1

Identify which tablespaces are holding a large # page / row locks that have not been escalated
May have to reduce the LOCKMAX value below default value of NUMLKTS to prevent -904

Lock Escalation - Resolving -904

- Increase COMMIT frequency of the program
- Add COMMIT processing to the program if it has none
- Explicitly LOCK some of the tablespaces used by the program –
LOCK TABLESPACE

Deadlocks / Timeouts

- Option L off of the main menu
- Position the cursor on a thread waiting for a lock - PF11 ZOOM to the Thread Detail panel
- On Thread Detail panel select option F to view SQL call waiting for the lock
- Determine why the lock wait is occurring

Alternative is to use Exception triggering with screen logging

Deadlocks / Timeouts

Session A - [24 x 80]

File Edit View Communication Actions Window Help

_____ ZLOCKC VTS 02 V310./I DSNC 06/14/06 21:02:52 2

> Help PF1 Back PF3 Up PF7 Down PF8 Zoom PF11

> L.

=====

> LOCKING CONFLICTS

XLOK

+Stat	Plan	Corrid	Type	Lvl	Resource
+ OWN	DSNREXX	DBA104S	DPAG	X	DB=SEMMLWL PS=GLWSPRJ PG=000132
+ WAIT	DSNREXX	DBA104S	DPAG	S	DB=SEMMLWL PS=GLWSPRJ PG=000132

=====

.....

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Display the Owner and the Waiter

Application Traces

- Selective tracing of thread events associated with DB2 applications
- Provides a view into the performance portion of a workload and resource consumption
 - SQL trace information
 - Sort activity information
 - Pageset access and scan information
 - Locking information
 - Buffer activity
 - Application In-DB2 time and In-DB2 CPU time
- To monitor statement level and below

Application Traces

- Records diagnostic information in regards to events in VSAM file
- 6 types of traces: Accounting, Audit, Global, Monitor, Performance, Statistics
- Start traces
 - DSNZPARM
 - -START TRACE command
- Each trace is composed of IFCID's
 - Defines a record that represents a trace event
 - Smallest tracing unit in DB2
- Trace data can be stored in data spaces or pre-allocated VSAM linear data sets
 - ICAT creates a default set if ATF data sets
 - Suggestion is that each user create their own for concurrent tracing

Application Trace Facility (ATF)

Once ATF starts, as qualified threads **complete** they are available for viewing from the 'View Trace Dialog'

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZATMENU  VTS      02      V310./I DSN 06/12/06 11:43:06  2
>      Help PF1                                Back PF3
> A.
>      Enter a selection letter on the top line.
=====
>      APPLICATION TRACE FACILITY MENU

- A  SPECIFY TRACE ..... Request and start an application trace
- B  VIEW TRACE ..... View the active trace
- C  STOP TRACE ..... Stop the active trace

- D  SELECT DATASET ..... Specify a trace dataset to view
- E  VIEW DATASET ..... View the selected trace dataset
- F  STOP VIEW ..... Release the selected dataset

- G  CREATE DSN ..... Create a new VSAM LDS for trace output

=====
  
```

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Start an application, store trace data, review the data collected, stop an application trace, release storage data set

ATF - Create DSN (G)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZLDSC      VTS      02      V310.KT DSNC 06/13/06 12:49:01  2
>      Help PF1                                     Back PF3
> A.G
> A-SPECIFY TRACE      B-VIEW TRACE      C-STOP TRACE      D-SELECT DSN
> E-VIEW DATASET      F-STOP VIEW      *-CREATE VSAM LDS
=====
>                                CREATE APPLICATION TRACE DSN
LDSC
*
:      DSN=_____      Data set name
:      SIZE=050      Size of dataset in megabytes (1-999)
:      VOLUME=_____      Volume id for dataset creation
=====

```

Default is 50 megabytes or 72 cylinders (get 450 threads / 3390 cylinder)
 Only uses the primary extent of a data set
 Requires the specification of a VOLSER

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ATF - Specify Trace Criteria (A)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZATRQ      VTS      02      V310./I DSN 06/12/06 11:52:47      2
> Help PF1                                           Back PF3
> A.A
> *-SPECIFY TRACE      B-VIEW TRACE      C-STOP TRACE      D-SELECT DSN
> E-VIEW DATASET      F-STOP VIEW      G-CREATE VSAM LDS
=====
> SPECIFY APPLICATION TRACE
ATRQ
+ Type DB2 Plan name to be traced. Also, provide additional
+ selection information to limit trace output. To save trace
+ for later viewing you must specify a data set name for DSN
+
DSN=_____ Data set name
: TIME=005      Number of mins to trace (001-060)
: PLANNAME=_____ Plan name or ALL for all active threads
: AUTHID=_____ DB2 authorization identifier
: TSOUSER=_____ TSO USERID (TSO foreground app)
: JOBNAME=_____ Jobname (TSO batch app)
: CICSTRAN=_____ CICS trans id
: CICSCONN=_____ CICS connection id
: PSBNAME=_____ IMS PSB name
: IMSID=_____ IMS ID of the IMS region
: LOCKDATA=Y      Collect DB2 lock trace recs? (Y/N)
: SCANDATA=Y      Collect DB2 scan trace recs? (Y/N)
  
```

Trace time is required
Default is 5 min; max 60 min

If trace data is only needed for the current session, the DSN is not required - this is referred to as an 'in-core' collection

Plan name is required

Can select an individual plan or all plans (threads)

Recommendation from Redbook: Turn off LOCK DATA and SCAN DATA unless needed

ATF - View Trace (B)

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

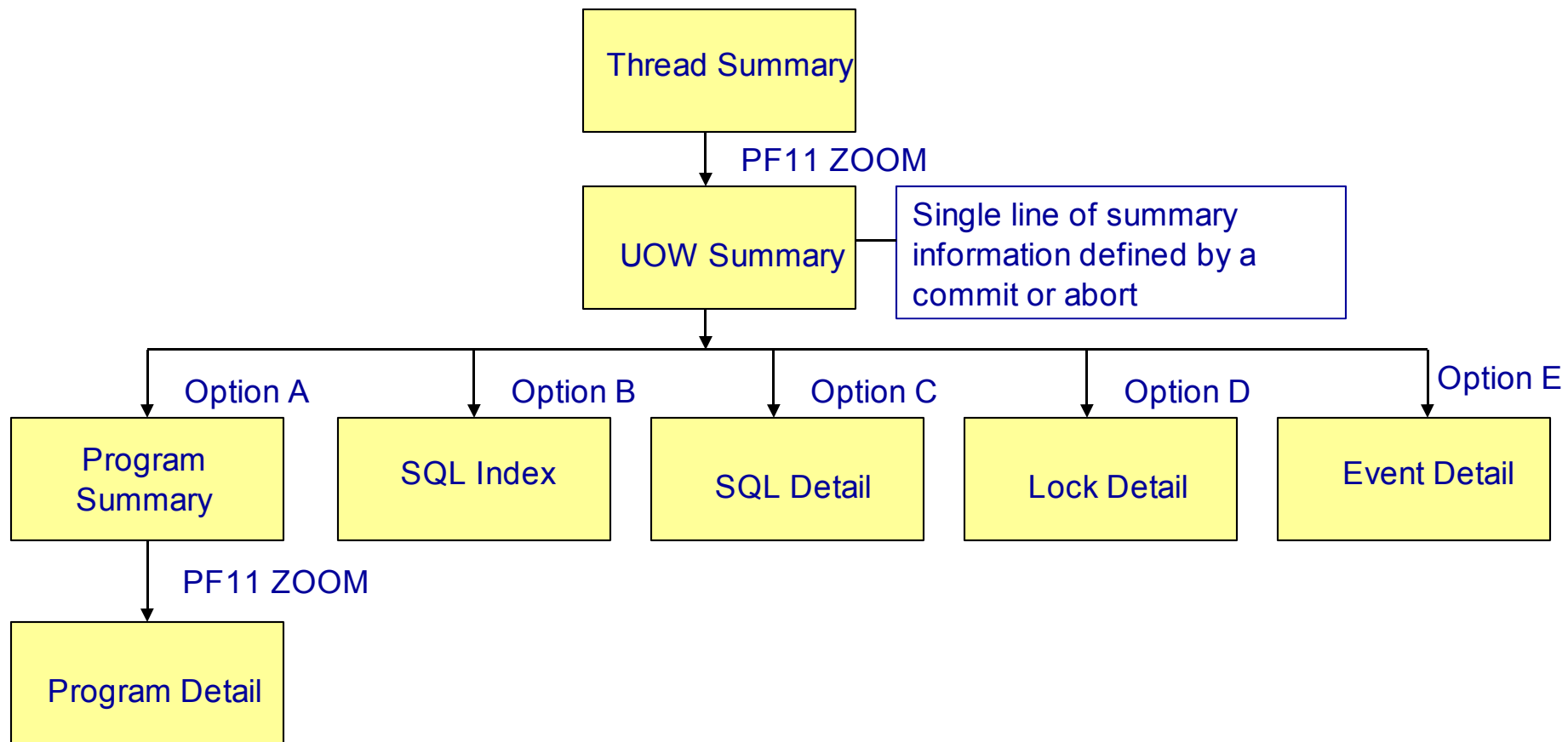
ZATVW  VTS  02  V310.KT DSN 06/13/06 14:14:41  2
> Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11
> A.B
> A-SPECIFY TRACE  *-VIEW TRACE  C-STOP TRACE  D-SELECT DSN
> E-VIEW DATASET  F-STOP VIEW   G-CREATE VSAM LDS
=====
> APPLICATION TRACE THREAD SUMMARY
ATVW
+ Trace Status      = ACTIVE      Trace Time Remaining   = 00:01:53
+ Trace Start Time  = 14:11:35    Trace End Time         = 00:00:00
+ Trace Time Limit  = 00:05:00    Trace Records Collected = 9193
+
+ Trace Request Information :
+
+ PLANNAME = ALL
+
+ Planname Connid  Corrid  Authid  InDB2 CPU  SQL  Commits  Aborts
+ -----
+ DB2PM  DB2CALL  CXEGA03  DB2PM  .25239    1162  182      0
=====
  
```

Look for excessive CPU
ZOOM PF11

Displays information about the traced application thread at the program or DBRM level
One line for each program that was executed at least one SQL call
Evaluate application resource use

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ATF - Navigation



Near-Term History

- Storing of all statistics and accounting records written by DB2 over a recent period of time
- Accounting record is written by DB2 when the thread terminates
 - Unless the thread has terminated, there will be no entries in near-term history
- Could be collecting performance data at the thread level
 - Sorting / Dynamic SQL / Locking / Scanning
- Short-Term History vs. Near-Term History
 - Short-Term History is real time snapshot of the system is taken at regular intervals - e.g. 1 per minute - and stored
 - May miss short running threads
 - Near-Term History captures all threads that complete in the recording interval

Near-Term History Benefits

- Some events are too short term to be viewed in short term
- Deadlocks / timeouts may be resolved before you can look at them
- Batch jobs may be executing thousands of SQL calls / second
- Track performance problems for specific times
- Identification of threads that have experienced problems in the last few hours
 - Excessive CPU / Elapse time
 - Excessive in-DB2 CPU / Elapse time
 - Threads with timeouts / deadlocks
 - Threads committing to infrequently
 - Threads that have aborted
 - Threads with excessive lock waiting time
 - Threads with excessive DB2 wait time for I/O

Near-Term History Management

- Must archive in order to empty the VSAM data sets
- ICAT defaults to 3 near term VSAM datasets
 - Can increase to 10
- The amount of history depends on how active your system is and how large the history data sets are
- Only stores dynamic SQL calls, and only if the collector option for dynamic SQL is turned on
 - Active threads show dynamic and static SQL

Main Menu Option H

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZHIST   VTS   02   V310./I DSN 06/09/06 13:56:49  2
>      Help PF1                                     Back PF3
> H.

>      Enter a selection letter on the top line.
=====
>      NEAR-TERM HISTORY INFORMATION MENU

_ A  STATISTICS ..... Near-Term History Statistics Information
_ B  THREAD HISTORY..... Near-Term Thread History Information
_ C  COLLECTOR INFORMATION .. Near-Term History Data Collector Information

=====

MA  a
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```

Near-Term History Options

Cannot make changes from this panel, have to edit member COPTxxxx in the library listed below

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
=====
      ZH2IN    VTS      02      V310./I DSNCL 06/09/06 14:10:57  2
> Help PF1      Back PF3      Up PF7      Down PF8
> H.C.A
> NEAR-TERM HISTORY INFORMATION: Enter a selection letter on the top line.

> *-COLLECTION OPTIONS      B-RECORD INFORMATION      C-DATASET STATUS
=====
> NEAR-TERM HISTORY DATA COLLECTION OPTIONS
COPT
+
+ H2 Collection Options
+ DB2sys      = DSNCL      Writeoption = VSAM      Interval   = 15
+ Archivejcl  = ARCVDSNC   Tracebufsz = 1024K    Ifireadtime = 010000
+ Maxhours    = 24         Suspcoll   = Yes      PostPCT    = 70
+ Destination = None
+
+ Statistics  = Yes        Dsnzparm   = Yes
+ Auditing    = (1 2 3 4 5 6 7 8 )
+ Accounting  = (1 2 3 7 8 ) Sort        = No      Lock Contention = Yes
+              =              Scan        = No      Lock Suspension  = No
+              =              Dynamic SQL = Yes     Negative SQL     = Yes
  
```

SCAN
DYNAMIC SQL
NEGSQL = NO
LOCKCOUNT
LOCKSUSP

Options are stored in COPTxxxx
which resides in this dataset

Sets :

CANDLET.XEGA.DEMOMVS.DSNCL.RKD2VS01

/F H2xxxx,VARY OPTION=COPTxxxx

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Near-Term History Collection Summary

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZH2RC    VTS    02    V310./I DSN 06/09/06 14:14:01  2
> Help PF1      Back PF3      Up PF7      Down PF8
> H.C.B
> NEAR-TERM HISTORY INFORMATION: Enter a selection letter on the top line.

> A-COLLECTION OPTIONS      *-RECORD INFORMATION      C-DATASET STATUS
=====
> NEAR-TERM HISTORY DATA COLLECTION RECORD INFORMATION
CREC
+
+ H2 Record Information
+
+ Record Type    Count    Timestamp of First Record    Timestamp of Last Record
+ -----
+ Accounting      2124    2006-06-08-09.20.49.662495    2006-06-09-14.11.51.635892
+ DDF Section     2092    2006-06-08-09.20.49.662495    2006-06-09-14.11.51.635892
+ Pkg Section     2116    2006-06-08-09.20.49.662495    2006-06-09-14.11.51.635892
+ BP Section      2840    2006-06-08-09.20.49.662495    2006-06-09-14.11.51.635892
+ Acctg Sum
+ DDF Section
+ BP Section
+ Statistics      115     2006-06-08-09.30.00.080040    2006-06-09-14.00.00.174115
+ DDF Section     115     2006-06-08-09.30.00.080040    2006-06-09-14.00.00.174115
+ BP Section      485     2006-06-08-09.30.00.080040    2006-06-09-14.00.00.174115
+ Perf-Lock Cont

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```

Near-Term History Data Set Status

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZH2DS      VTS      02      V310./I DSN 06/09/06 14:15:20  2
>      Help PF1      Back PF3      Up PF7      Down PF8
> H.C.C
> NEAR-TERM HISTORY INFORMATION: Enter a selection letter on the top line.

> A-COLLECTION OPTIONS      B-RECORD INFORMATION      *-DATASET STATUS
=====
>      NEAR-TERM HISTORY DATA COLLECTOR DATASET STATUS
H2DS
+ H2 Dataset      Status      %Full
+ -----
+ CANDLET.XEGA.DEMOMVS.DSNC.RKD2VS01      UNAVAIL      100.0
+ CANDLET.XEGA.DEMOMVS.DSNC.RKD2VS02      UNAVAIL      100.0
+ CANDLET.XEGA.DEMOMVS.DSNC.RKD2VS03      ACTIVE       66.3
=====

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```


Near-Term History Filter Options

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZHAFL    VTS    02    V310./I DSN0 06/09/06 15:08:49    2
>      Help PF1                                Back PF3
> H.B
>      Specify filter options then press ENTER to continue
=====
>                                NEAR-TERM THREAD HISTORY FILTER OPTIONS
HAFL
+ Time of oldest available record: 05/11/2006 07:36:09.376381
+ Time of latest record:          06/09/2006 15:07:38.502858
+ Total number of records:        1487
+
:  START-DATE/TIME = _____ (mm/dd/yyyy or dd.mm.yyyy, hh:mm)
:  END-DATE/TIME   = _____ (mm/dd/yyyy or dd.mm.yyyy, hh:mm)
:  RELATIVE-START  = 1 HOUR ago (1-nn, MINS or HOURS)
:  RELATIVE-END    = _____ from start (1-nn, MINS or HOURS)
:  REPORT-INTERVAL = 15 minutes (5-60 mins, in 5 min increments)
+
+ Specify the values to be used to filter the Thread History displays. Wildcard
+ values * (multiple characters) or ? (single character) can be specified.
:  PLAN            = _____
:  AUTHID          = _____
:  CONNID          = _____
:  CONNTYPE        = _____
:  PACKAGE         = _____

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```

Specify the reporting period, the intervals into which the report is divided, and filter options that restrict the data that is displayed on thread history panels

Hit ENTER to display options

Near-Term History Statistics Summary

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZHSMS   VTS   02   V310./I DSN 06/09/06 15:01:28   2
>      Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11
> H.A.A
>
>      Enter a selection letter on the top line.
>
> *-SUBSYSTEM SUPPORT      B-BIND      C-BUFFER POOL      D-GROUP BP
> E-DISTRIBUTED DATABASE  F-EDM POOL      G-LOG MANAGER      H-OPEN/CLOSE
> I-SQL/RID/PARALLEL/PROC J-LOCK/CLAIM/DRAIN K-GLOBAL LOCK      L-DB2 COMMANDS
> O-OPTIONS
=====
>      SUBSYSTEM SUPPORT MANAGER STATISTICS SUMMARY BY REPORT INTERVAL
HSMS
+ Collection Interval: 15 min                      Start: 06/08 15:00
+ Report Interval:    15 min  Combine Level: NONE    End: 06/09 15:01
+
+
+      Create      Total      Queued
+      Thread/     Commit/     at
+      Interval    Minute     Commits  Abort  Reqs  Cthread  Indoubt  EOT+EOM
+      -----
+ 06/09 15:01      .00      56.00      112      0      0      0      0
+ 06/09 15:00      .00      69.53     1043      0      0      0      0
+ 06/09 14:45      .00      69.53     1043      0      0      0      0
+ 06/09 14:30      .00      69.13     1037      0      0      0      0
+ 06/09 14:15      .13      69.87     1048      2      0      0      0
  
```

Look for higher
than usual
numbers

15 min interval

Only shows detail of the threads that have completed in the last few hours

Near-Term History Thread Summary

Session A - [24 x 80]

File Edit View Communication Actions Window Help

ZHATACT VTS 02 V310./I DSNC 06/12/06 15:36:18 3

> Help PF1 Back PF3 Up PF7 Down PF8 Zoom PF11

> Enter a selection letter on the top line.

> *-SUMMARY B-BUFFER POOL C-DB2 TIME D-LOCK/SCAN/SORT

> =====

> THREAD HISTORY SUMMARY

HATH

+ Report Interval: 15 mins Start: 06/12 14:30:00.000000

+ Report Filtered: NO End: 06/12 14:45:00.000000

act

End Time	Plan	Authid	Elapsed Time	CPU Time	SQL	Commit	Abrt	Pkg	Status
14:35:36.290	DISTSERV	KLAYLO	.33	.005	7	3	2	1	
14:35:35.963	DISTSERV	KLAYLO	600.34	.008	18	6	2	1	

Sort by elapse time

Describes threads that completed in the interval

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Near-Term History Thread Detail

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZHTACT   VTS      02      V310./I DSN 06/12/06 15:40:58   2
> Help PF1          Back PF3          Up PF7          Down PF8

>          THREAD HISTORY:  Enter a selection letter on the top line.

> *-THREAD DETAIL   B-LOCK COUNTS  C-LOCK WAITS    D-GLOBAL LOCKS  E-SORT/SCAN
> F-DYNAMIC SQL     G-SQL COUNTS   H-DISTRIBUTED   I-BUFFER POOL   J-GROUP BP
> K-PACKAGE SUMMARY L-RES LIMIT    M-PARALLEL TASKS
=====
>          THREAD HISTORY DETAIL
HPLN
+ Thread:  Plan=DISTSERV  Connid=SERVER  Corrid=JAVA.EXE  Authid=KLTAILO
+ Attach:  APPLDIR       DB2=DSNC      MVS=MVSA
+ Dist :   Type=DATABASE ACCESS, Luwid=G9274099.LD12.060612174227
+ Time :   Start=06/12/2006 14:35:35.963306      End=06/12/2006 14:35:36.290888
act
+ Termination Status =          NEWUSER      Commits          =          3
+ Total Elapsed Time  =          00:00:00.328  Aborts            =          2
+ Total CPU Time      =          00:00:00.005   Parallel Tasks     =          0
+ Total Stored Proc CPU =          00:00:00.000
+ Stored Proc Wait    =          00:00:00.000   Stored Proc Wait Cnt =          0
+
+ In-DB2 Times              Total
+ -----

```

Contains detailed information about the activity of an individual DB2 thread or parallel task that has completed execution

Near-Term History Dynamic SQL

When starting the online historical collector, you must use the word DYNAMICSQL(YES) in order for the SQL to be displayed on this panel

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZHTCALL VTS 02 V310./I DSNC 06/12/06 16:27:55 2
> Help PF1 Back PF3 Up PF7 Down PF8

> THREAD HISTORY: Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS D-GLOBAL LOCKS E-SORT/SCAN
> *-DYNAMIC SQL G-SQL COUNTS H-DISTRIBUTED I-BUFFER POOL J-GROUP BP
> K-PACKAGE SUMMARY L-RES LIMIT M-PARALLEL TASKS
=====
> THREAD HISTORY DYNAMIC SQL CALLS
HPLN
+ Thread: Plan=DISTSERV Connid=SERVER Corrid=JAVA.EXE Authid=KLTAILO
+ Attach: APPLDIR DB2=DSNC MVS=MVSA
+ Dist : Type=DATABASE ACCESS, Luwid=G9274099.LD12.060612174227
+ Time : Start=06/12/2006 16:05:42.081889 End=06/12/2006 16:05:42.333142
call
+
: Select Call=NEXT (FIRST/LAST/NEXT/PREV/+nnnnn/-nnnnn/Snnnnn)
+
+ SQL Statement ( 1 of 3)
+
+ SELECT V_VALUE
+ FROM DB2PM.VERSION
+ WHERE V_FIELD = 'OPERATING SYSTEM' FOR FETCH ONLY

```

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00084 and port 23

Buffer Manager Information

Buffer Manager moves data from disk to memory

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
[Icons]

ZBMGR VTS 02 V310./I DSNCL 06/08/06 13:06:55 2
Help PF1 Back PF3 Up PF7 Down PF8 Sort PF10 Zoom PF11
> R.A.A
>
> *-BUFFER POOL B-GROUP BUFFER POOL
=====
> BUFFER MANAGER INFORMATION

BMGR
+ Current Number Open Datasets = 63
+ High Water Mark Open Datasets = 63
+ Maximum Number Open Datasets Allowed = 32767
+ Open Dataset Count In Active Pools = 64
+
+ *
+ Pool VP Pages Pages Getp Read Prefetch Write
+ ID Size Alloc In Use Rate I/O Rate Req Rate I/O Rat
+
+ BP0 20000 20000 11 15.35 .00 2.18 .00
+ BP1 1000 1000 3 5.35 .00 1.00 .00
+ BP2 1000 1000 0 2.67 .00 .00 .00
+ BP11 1000 0 0 .00 .00 .00 .00
+ BP15 2000 0 0 .00 .00 .00 .00
+ BP16 2000 0 0 .00 .00 .00 .00

```

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00096 and port 23

Place cursor on BP
Hit PF11 to get details

Buffer Pool Detail

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZBP      VTS      02      V310./I DSN 06/08/06 13:05:14  2
> Help PF1      Back PF3      Up PF7      Down PF8
>
> *-BUFFER POOL  B-GROUP BUFFER POOL  C-BUFFER POOL SNAPSHOT  H-HISTORICAL
=====
>                                BUFFER POOL DETAIL

BP      0
+ Collection Interval:  REALTIME      Start:  06/08 13:03:59
+ Report Interval:      1 min         End:    06/08 13:05:14
+
+ Virtual Buffer Pool Size=      20000
+ VPOOL Buffers Allocated =      20000
+ VPOOL Buffers in Use   =         11
+ VPOOL Buffers to be Del =         0
+ Use Count               =         43
+
+ VP Sequential Thresh   =      80%
+ Deferred Write Thresh  =      30%
+ VP Parallel Seq Thresh =      50%
+
+ Getpages per Sync I/O  =  2293.68
+ Prefetch per I/O       =  7607.40
+ Seq Prefetch per I/O   = 21633.00
+
+ Vert Deferred Write Thresh =      5%
+ Sysplex Parallel Thresh   =      0%
+
+ Pages Written per Write I/O =  1.05
+ Pages Read per Prefetch    =  .00
+ Pages Read per Seq Prefetch =  .00

Thresholds → { VP Sequential Thresh = 80%
                Deferred Write Thresh = 30%
                VP Parallel Seq Thresh = 50%
                Vert Deferred Write Thresh = 5%
                Sysplex Parallel Thresh = 0%
                Pages Written per Write I/O = 1.05
                Pages Read per Prefetch = .00
                Pages Read per Seq Prefetch = .00
                }

USE COUNT: Number of open tablespaces / indexspaces in BP
    
```

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

Buffer Pool Detail

Hit ratios

Session A - [24 x 80]

File Edit View Communication Actions Window Help

ZBP VTS 02 V310./I DSN 06/08/06 13:21:45 25

+ List Prefetch per I/O = .00 Pages Read per List Prefetch = .00

+ Dyn Prefetch per I/O = 55.15 Pages Read per Dyn Prefetch = .37

+ Max Concur Prefetch = 0 Workfile Maximum = 0

+ BP Hit % - Random = 99.9% .0%

+ BP Hit % - Sequential = 99.9% .0%

+ +

	TOTAL QUANTITY	INTERVAL QUANTITY	/SECOND (321)	/THREAD (0)	/COMMIT (378)
+ Getpage Requests	1063417	4974	15.50	.00	13.16
+ Getpage Requests - Sequential	527728	2484	7.74	.00	6.57
+ Getpage Requests - Random	535689	2490	7.76	.00	6.59
+ Getpage Failed - VPOOL Full	0	0	.00	.00	.00
+ Getpage Failed - Cond Request	0	0	.00	.00	.00
+ +					
+ Sync Read I/O Operations	457	0	.00	.00	.00
+ Sync Read I/Os - Sequential	2	0	.00	.00	.00
+ Sync Read I/Os - Random	455	0	.00	.00	.00
+ Page-in Required for Read I/O	768	0	.00	.00	.00
+ Pages Read via Seq Prefetch	97	0	.00	.00	.00
+ Seq Prefetch I/O Operations	7	0	.00	.00	.00
+ Sequential Prefetch Requests	153590	704	2.19	.00	1.86
+ Pages Read via List Prefetch	0	0	.00	.00	.00

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

Buffer Pool Detail

Session A - [24 x 80]

File Edit View Communication Actions Window Help

	ZBP	VTs	02	V310./I	DSNC	06/08/06	13:21:45	48
+ List Prefetch I/O Operations	0		0	0	.00	.00	.00	
+ List Prefetch Requests	0		0	0	.00	.00	.00	
+ Pages Read via Dyn Prefetch	263		0	0	.00	.00	.00	
+ Dyn Prefetch I/O Operations	13		0	0	.00	.00	.00	
+ Dyn Prefetch Requests	717		0	0	.00	.00	.00	
+ Prefetch Failed - No Buffer	0		0	0	.00	.00	.00	
+ Prefetch Failed - No Engine	0		0	0	.00	.00	.00	
+								
+ Parallel Group Requests	0		0	0	.00	.00	.00	
+ Prefetch I/O Streams Reduced	0		0	0	.00	.00	.00	
+ Parallelism Downgraded	0		0	0	.00	.00	.00	
+ Prefetch Quan Reduced to 1/2	0		0	0	.00	.00	.00	
+ Prefetch Quan Reduced to 1/4	0		0	0	.00	.00	.00	
+								
+ Pages Updated	642569		3024	9.42	.00	.00	8.00	
+ Pages Written	164		0	.00	.00	.00	.00	
+ Page-in Required for Write I/O	0		0	.00	.00	.00	.00	
+ Write I/O Operations	121		0	.00	.00	.00	.00	
+ Immediate (Sync) Writes	36		0	.00	.00	.00	.00	
+ Write Engine Not Available	0		0	.00	.00	.00	.00	
+								
+ Vert Defer Wrt Threshold Reached	0		0	.00	.00	.00	.00	
+ Deferred Write Threshold Reached	0		0	.00	.00	.00	.00	

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

WTH – when 97.5% of BP pages are in use, deferred write is disabled

DWTH – when DB2 uses 95% of BP, begins to operate at the row level rather than the page level = increased CPU

Total qty

Buffer Pool Snapshot

Open page sets in a BP

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
[Icons]

          ZBPSN      VTS      02      V310./I DSNB 06/08/06 13:47:04 2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
>
> A-BUFFER POOL      B-GROUP BUFFER POOL      *-BUFFER POOL SNAPSHOT      F-FILTER
=====
>
>          BUFFER POOL SNAPSHOT OPEN PAGESETS
>
BPSN 0
+ <<< The following BP snapshot was collected on 06/08/06 at 13:47:04. >>>
+
+ *
+ Pageset
+ Name
+ -----
+ DB2PM.UIXRDB2C      INDEXSPACE      0      1      4      0
+ DB2PM.UIXR15HY      INDEXSPACE      0      1      4      0
+ DSNDB01.DBD01      TABLESPACE      0      1      114      0
+ DSNDB01.DSNLLX01      INDEXSPACE      0      1      17      0
+ DSNDB01.DSNLLX02      INDEXSPACE      0      1      10      0
+ DSNDB01.DSNSCT02      INDEXSPACE      1      1      8      0
+ DSNDB01.DSNSPT01      INDEXSPACE      0      1      60      0
+ DSNDB01.SCT02      TABLESPACE      1      1      114      0
+ DSNDB01.SYSLGRNX      TABLESPACE      0      1      9      1
+ DSNDB01.SYSUTILX      TABLESPACE      0      1      3      0

```

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

Buffer Pool Snapshot

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZBPSD   VTS   02   V310./I DSNB 06/08/06 13:48:20  2
> Help PF1      Back PF3      Up PF7      Down PF8
>
=====
>          BUFFER POOL SNAPSHOT DATASETS
>
BPSD
+ BP: 0    Pageset Name: DSNCB01.SCT02    Type: TABLESPACE  Open Datasets:  1
+
+ Dataset Name: DSNCCAT.DSNDBC.DSNCB01.SCT02.I0001.A001
+
+ VP Pages Current      =      114    HP Pages Current      =      2
+ VP Pages Maximum      =      114    HP Pages Maximum      =    -1344M
+ VP Pages Changed      =      0      VP Pages Changed Maximum =      0
+ Sync I/O Total Pages  =      24
+ Sync I/O Average Delay =      12    Sync I/O Maximum Delay  =      31
+ Async I/O Average Delay =      0    Async I/O Maximum Delay  =      0
+ Async I/O Total Pages  =      90    Async I/O Total I/O Count =      3
=====

```

MA a

Connected to remote server/host demomvms.demopkg.ibm.com using lu/pool TCP00096 and port 23

EDM Pool

- Used to maintain DBD's, cursor tables, authorization cache, and dynamic statement cache
- Size specified in DSNZPARM

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZEDMP      VTS      02      V310./I DSN 06/08/06 14:18:04  2
>      Help PF1      Back PF3      Up PF7      Down PF8
> R.C
>
> A-EDM POOL SNAPSHOT                                     H-HISTORICAL
=====
> EDM POOL INFORMATION
EDMP
+ Collection Interval: REALTIME                               Start: 06/08 14:18:02
+ Interval: 2 sec                                           End: 06/08 14:18:04

+ Page      Pages      Pct      Percent of Total EDM Pool
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+ In Use      124      0%      .      .      .      .      .      .      .      .
+           108      0%      .      .      .      .      .      .      .      .
+           16      0%      .      .      .      .      .      .      .      .
+           0      0%      .      .      .      .      .      .      .      .
+ Available 35473 100%      ----->
+           30      0%      .      .      .      .      .      .      .      .
+ SKPTs      513      1%      >      .      .      .      .      .      .      .
+ SQL CACHE   99      0%      .      .      .      .      .      .      .      .
+ Free      34831  98%      ----->
+ Total Pages 35597 100%      ----->
+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----10---20---30---40---50---60---70---80---90---100

```

Amount of EDM pool in use at the end of the interval

Amount of EDM pool that was available at the end of the interval

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00096 and port 23

EDM Pool

Session A - [24 x 80]

File Edit View Communication Actions Window Help

	ZEDMP	VTs	02	V310./I	DSNC	06/08/06	14:32:53	25
			TOTAL	INTERVAL	/SECOND	/THREAD	/COMMIT	
			QUANTITY	QUANTITY	(176)	(0)	(203)	
+ Failures due to EDM Pool Full			0	0	.00	.00	.00	
+ Database Descriptor (DBD) Reqs			86053	214	1.22	.00	1.05	
+ DBD Loads			6	0	.00	.00	.00	
+ % of DBD Loads from DASD			.01%	.00%	n/c	n/c	n/c	
+ Cursor Table (CT) Reqs			55	0	.00	.00	.00	
+ CT Loads			15	0	.00	.00	.00	
+ % of CT Loads from DASD			27.27%	.00%	n/c	n/c	n/c	
+ Package Table (PT) Reqs			219912	533	3.03	.00	2.63	
+ PT Loads			113	0	.00	.00	.00	
+ % of PT Loads from DASD			.05%	.00%	n/c	n/c	n/c	
+ Dynamic Sql (DSC) Reqs			778	11	.06	.00	.05	
+ DSC Loads			40	0	.00	.00	.00	
+ % of DSC Loads into Pool			5.14%	.00%	n/c	n/c	n/c	

=====

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00096 and port 23

Should always be 0

Should be < 20%

Should be < 40%

EDM Pool Snapshot

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

ZEDSN VTS 02 V310./I DSNC 06/08/06 14:37:18 2
> Help PF1 Back PF3 Zoom PF11
> R.C.A

=====
> EDM POOL SNAPSHOT SUMMARY
>
EDSN
+ <<< The following EDM snapshot was collected on 06/08/06 at 14:37:18. >>>
+
+ EDM Storage Type % of Pool Pages Alloc Count of Entries Avg Pages Entry Max Pages Entry
+ -----
+ DBDs .3% 108.0 6 18.0 8.0
+ CTs .0% 16.0 7 2.2 10.0
+ PTs .0% .0 0 .0 .0
+ SKCTs .1% 28.5 4 7.1 25.2
+ CACHE .0% 1.5 2 .7 .7
+ SKPTs 1.3% 462.0 43 10.7 95.0
+ SQL CACHE .3% 99.0 40 2.4 9.0
+ FREE 98.0% 34831.0 6 5805.1 3.0
=====

MA a
Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00096 and port 23

```

Active Traces

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZTRACES VTS 02 V310./I DSN06/08/06 14:52:28 2
> Help PF1 Back PF3 Up PF7 Down PF8 Zoom PF11
> R.F
=====
> ACTIVE TRACE SUMMARY
DTRS
+ Type TNO Trace Class Destination Planname Authid
+ -----
+ STATISTICS 001 01,03,04,05,06,08 SMF * *
+ AUDIT 002 01 SMF * *
+ ACCOUNTING 003 01,02,03,07,08,10 SMF * *
+ MONITOR 004 01 OP1 * *
+ ACCOUNTING 005 01,02,03,07,08 OP1 * *
+ MONITOR 006 01 OP2 * *
+ AUDIT 007 01,02,03,04,05,06,07,08 OP2 * *
+ ACCOUNTING 008 01,02,03,07,08 OP2 * *
+ PERFORMANCE 009 30 OP2 * *
=====

```

MA a

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DB2 Commands

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

_____ ZCMSD   VTS    02      V310./I DSN 06/08/06 16:18:26   2
>      Help PF1      Back PF3      Up PF7      Down PF8
> R.L
>
> H-HISTORICAL
=====
>                                DB2 COMMANDS STATISTICS

CMDS
+ Collection Interval:  REALTIME                      Start:  06/08 16:18:22
+ Report Interval:      4 sec                          End:    06/08 16:18:26
+
+
+ DB2 Command          TOTAL   INTERVAL  /SECOND   % OF
+                      QUANTITY QUANTITY   (    4)   TOTAL
+ -----
+ ALTER BUFFERPOOL          0         0        .00        .00
+ ALTER GROUPBUFFERPOOL     0         0        .00        .00
+ ALTER UTILITY              0         0        .00        .00
+ ARCHIVE LOG                0         0        .00        .00
+ CANCEL (DDF) THREAD        0         0        .00        .00
+ DISPLAY ARCHIVE            0         0        .00        .00
+ DISPLAY BUFFERPOOL         0         0        .00        .00
+ DISPLAY DATABASE           0         0        .00        .00
+ DISPLAY GROUP              5         0        .00        .00

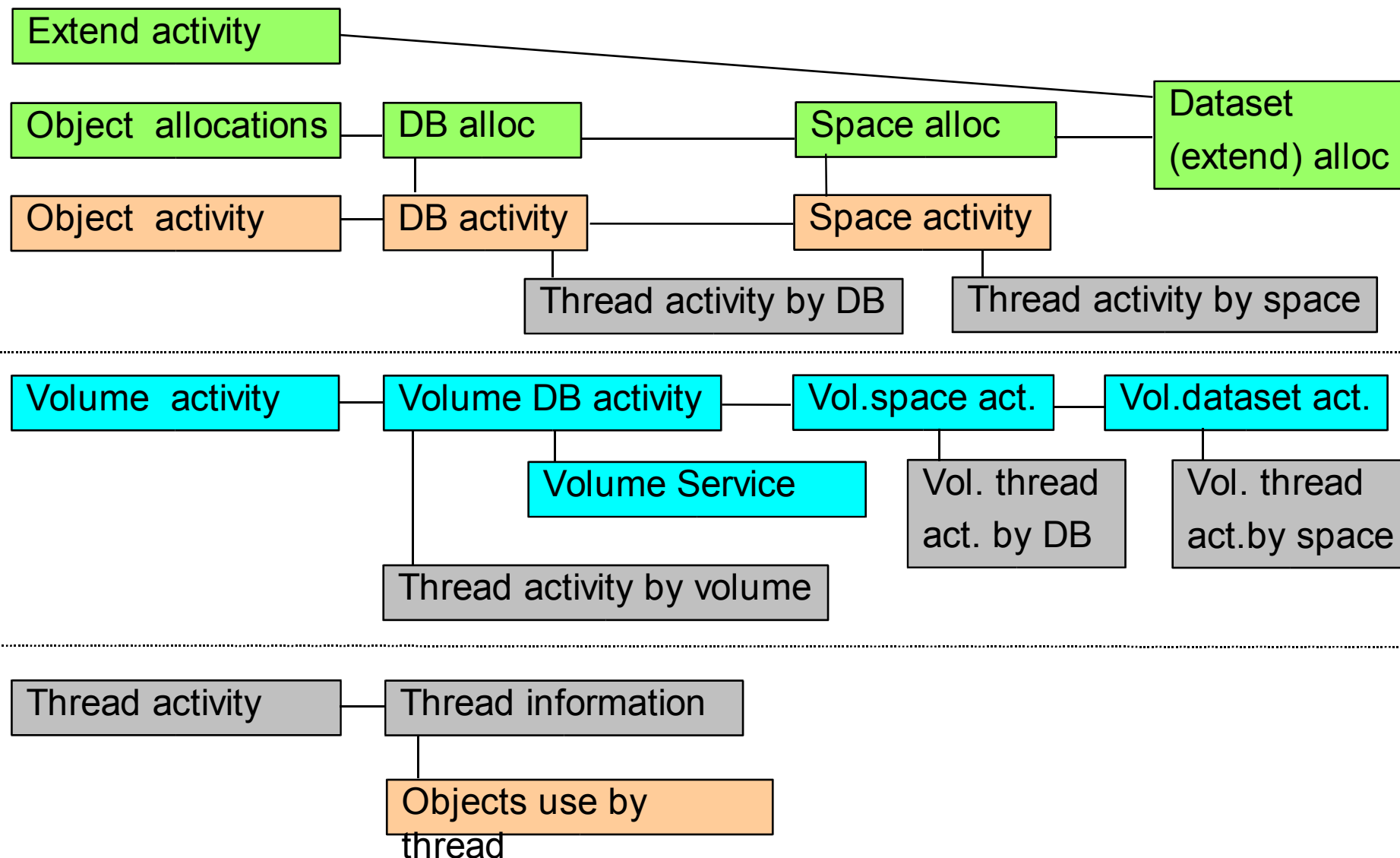
MA  a                                A
Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00096 and port 23

```

Object Analysis

- Analyzes objects that are currently allocated
- Best used for reactive problems - data is not stored
- Provides information regarding
 - Linear dataset extend activity
 - I/O activity at the DASD volume level
 - Object activity from a DB2 perspective
- Does not use traces
- Overhead is in OMPE server started task

Object Analysis



Object Analysis

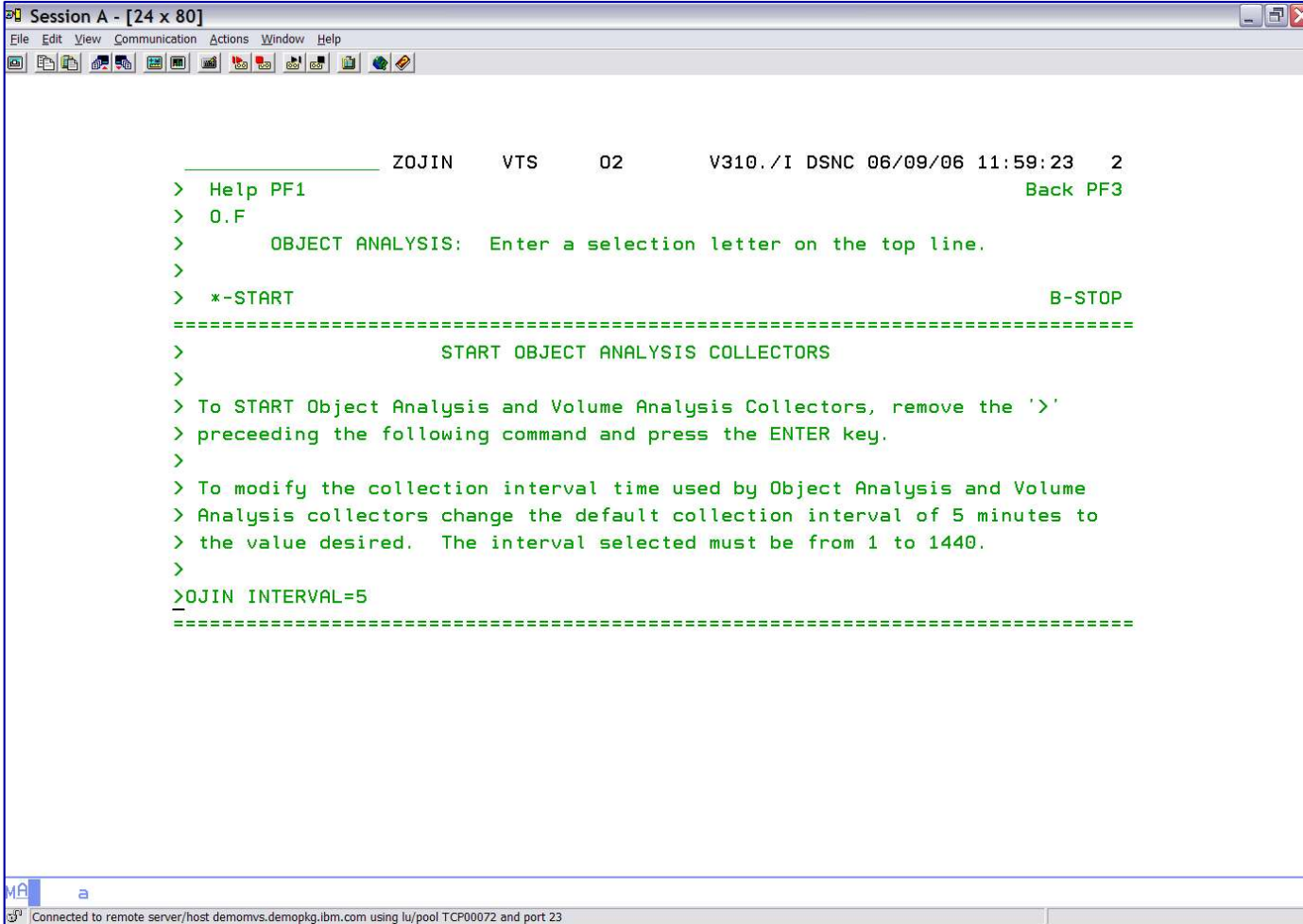
- How to start
 - ICAT - AUTOSTART function for Object / Volume analysis - would be enabled when the OMPE server is activated (not recommended)
 - Manually - START OBJECT ANALYSIS COLLECTORS Panel (O.F from the Main Menu)
 - Have to select an interval expressed in minutes (1 – 1440)
 - EVENTMGR has to be activated
 - Issue the MVS Modify command from SDSF console interface
F name.of.ompe.server.address.space,DISPLAY
 - Must be active – if not issue the following command
F name.of.ompe.server.address.space S EVENTMGR

Recommendation: Automatically start EVENTMGR and manually start Object Analysis without thread level detail

***F ompe.server.address.space, F EVENTMGR,START DB2=ssid,
INTERVAL=nn,THREAD=NO***

Manually Start Object Analysis

- Main Menu Option O - Object Analysis
- Option F - Collector Control



```
Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZOJIN   VTS   02      V310./I DSNC 06/09/06 11:59:23   2
> Help PF1                                     Back PF3
> O.F
>      OBJECT ANALYSIS: Enter a selection letter on the top line.
>
> *-START                                     B-STOP
=====
>      START OBJECT ANALYSIS COLLECTORS
>
> To START Object Analysis and Volume Analysis Collectors, remove the '>'
> preceding the following command and press the ENTER key.
>
> To modify the collection interval time used by Object Analysis and Volume
> Analysis collectors change the default collection interval of 5 minutes to
> the value desired. The interval selected must be from 1 to 1440.
>
>OJIN INTERVAL=5
=====
```

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00072 and port 23

Filtering Objects

Session A - [24 x 80]

File Edit View Communication Actions Window Help

_____ ZOJ00 VTS 02 V310./I DSNC 06/09/06 12:09:44 2

> Help PF1 Back PF3

> O.E

=====

> DISPLAY OPTIONS FOR

> OBJECT ACTIVITY SUMMARY AND OBJECT ALLOCATION SUMMARY DISPLAYS

OJ00

+ Following options applied to both displays ;

: DATABASE=_____ Filter display output by database name

+

+ Following options applied to OBJECT ALLOCATION SUMMARY display

: EXTSDSN>_____ Filter display output by extents/dataset ratio

: MAXEXTS>_____ " " by max extents/dataset

+

+ Following options applied to OBJECT ACTIVITY SUMMARY display

: PERCGETP>_____ Filter display output by % of getpage activity

: PERCIO>_____ " " by % of I/O activity

: RATE=_____ Display activity rates or counts (yes/no)

=====

Only filters the display results, not what is captured

MA a A

Connected to remote server/host demomvms.demopka.ibm.com using lu/pool TCP00072 and port 23

Object Allocations

Display
allocations of
allocated
databases

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help

      ZQJAS      VTS      02      V310./I DSNC 06/09/06 11:51:59  2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
> O.A
>      OBJECT ANALYSIS: Enter a selection letter on the top line.
>
> *--OBJECT ALLOCATIONS      B--OBJECT ACTIVITY      C--VOLUME ACTIVITY
> D--EXTEND ACTIVITY      E--DISPLAY OPTIONS      F--COLLECTOR CONTROL
=====
>      OBJECT ALLOCATION SUMMARY
OJAS
+ Total Databases = 12      Total Spaces = 153      Total Datasets = 153
+ *
+ Database      Spaces      Tblsp      Indxs      DSNs      Extents      Exts/DSN      Max Exts
+ -----
+ ABP1DB          4          2          2          4          4          1.0          1
+ ANLDBASE        2          0          0          2          3          1.5          2
+ DB2PM           10          3          7          10         11          1.1          2
+ DNET315D        11          2          9          11         12          1.0          2
+ DNET3151        2          1          1          2          2          1.0          1
+ DSNDB01         10          5          5          10         53          5.3          34
+ DSNDB04         22          11         11         22         22          1.0          1
+ DSNDB06         80          13         67         80         84          1.0          2
+ DSNDB07         3          3          0          3          148         49.3         90
+ DSNRGFDB        1          0          1          1          1          1.0          1

```

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00072 and port 23

Objects I/O Activity

Session A - [24 x 80]

File Edit View Communication Actions Window Help

Drill down to tablespace

ZQJOS VTS 02 V310./I DSN 06/09/06 12:45:03 2

> Help PF1 Back PF3 Up PF7 Down PF8 Sort PF10 Zoom PF11

> O.B

> OBJECT ANALYSIS: Enter a selection letter on the top line.

> A-OBJECT ALLOCATIONS *OBJECT ACTIVITY C-VOLUME ACTIVITY

> D-EXTEND ACTIVITY E-DISPLAY OPTIONS F-COLLECTOR CONTROL

=====

> OBJECT ACTIVITY SUMMARY

OJOS

+ Interval Time = 00:15:00 Interval Elapsed = 00:08:09

+ Total Getpage = 11382 Total I/O = 4

+ *

+ Database	% of Getp	% of I/O	Getp per RIO	Getpage	Sync Read	Pre Fetch	Async Write	Other Write
+ DSNDB01	.0%	75.0%	5.0	5	0	0	3	0
+ DSNRTSDB	.0%	25.0%	1.0	1	0	0	1	0
+ DB2PM	34.4%	.0%	3924.0	3924	0	0	0	0
+ DSNDB07	59.7%	.0%	6804.0	6804	0	0	0	0
+ DSNDB06	5.6%	.0%	648.0	648	0	0	0	0

=====

Note the relationship between the ratio of I/O activity and the number of getpages. No getpages indicates that all pages needed were in the BP

Sort by % of I/O Activity to see which database is incurring the highest level of DB2 initiated activity

MA a

Connected to remote server/host demomvs.demopkg.ibm.com using lu/pool TCP00072 and port 23

Volume Activity

Session A - [24 x 80]

File Edit View Communication Actions Window Help

_____ ZQJVS VTS 02 V310./I DSNC 06/09/06 12:11:47 2

> Help PF1 Back PF3 Up PF7 Down PF8 Sort PF10 Zoom PF11

> O.C

> OBJECT ANALYSIS: Enter a selection letter on the top line.

>

> A-OBJECT ALLOCATIONS B-OBJECT ACTIVITY *-VOLUME ACTIVITY

> D-EXTEND ACTIVITY E-DISPLAY OPTIONS F-COLLECTOR CONTROL

=====

> VOLUME ACTIVITY SUMMARY

OJVS

+ Interval Time = 00:15:00 Interval Elapsed = 00:04:53

+ *

+ Volume	Unit	Util%	Vol Serv	Total I/O	DB2 I/O	% DB2 I/O	Alloc DSNs	Alloc Exts	Exts/ DSN
+ DMPD01	071F	.0%	1.2	39	0	.0%	6	9	1.5
+ DMPD02	0734	.0%	1.4	25	0	.0%	13	13	1.0
+ DMPD03	0712	.0%	1.4	81	0	.0%	10	11	1.1
+ DMPD04	0713	.0%	1.4	77	0	.0%	7	7	1.0
+ DMPD05	0714	.0%	1.8	4	0	.0%	5	94	18.8
+ DMPD06	0715	.0%	1.4	6	0	.0%	12	12	1.0
+ DMPD08	0717	.0%	1.3	3	0	.0%	9	9	1.0
+ DMPD09	0718	.0%	1.0	18	0	.0%	8	13	1.6
+ DMPD10	0719	.0%	1.3	3	0	.0%	9	10	1.1

MA a

Connected to ren

High volume util % and low DB2 I/O indicates I/O outside of DB2

Volume util % and DB2 I/O are close, indicates potential DB2 workload issue – may go and look at object activity

Assist with the identification of heavy IO activity against a dataset not owned by DB2

Documentation

- SC18-9988 Monitoring Performance from the OMEGAMON Classic Interface Version 4.1.0
 - How to use the 3270 Classic Interface
- SC18-9981 Monitoring Performance from ISPF Version 4.1.0
 - How to use the PE ISPF Interface
- SC18-9982 Monitoring Performance from Performance Expert Client Version 4.1.0
 - How to use the PE Workstation Client



Information On Demand

OMPE Batch Reports

IBM Software Group

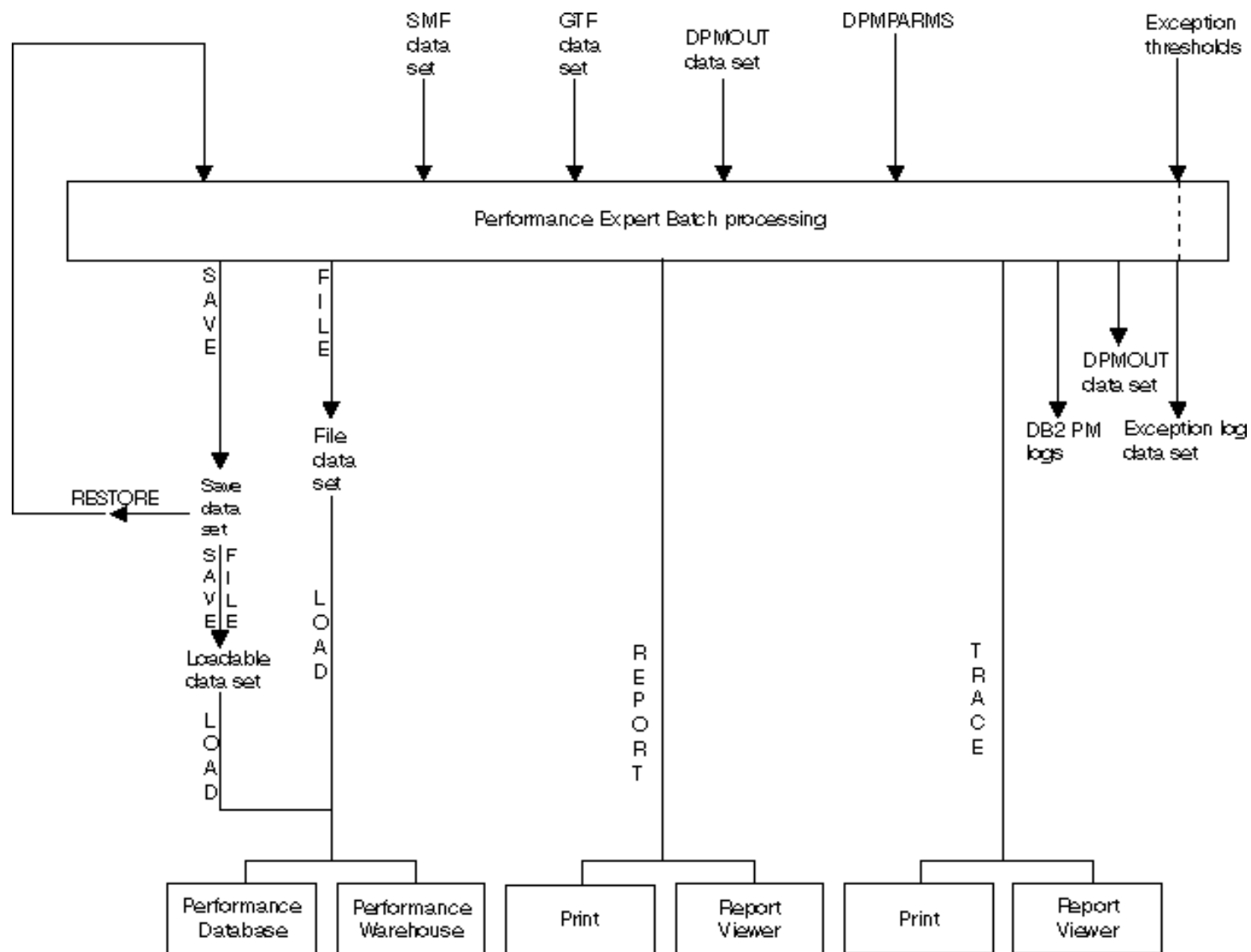


ON DEMAND BUSINESS™

Basics

- Batch reporting is based on terminated DB2 activities
 - These activities are reflected in previously collected DB2 trace records
 - Information is provided at various levels of detail depending on need
 - Filtering allows minimizing the input and the amount of output
 - Ordering allows the ordering of reports by keys and intervals
- Use batch reports to
 - Determine DB2 subsystem performance and efficiency
 - Tune the DB2 subsystem
 - Identify and resolve performance problems
 - Measure an application's performance and resource cost
 - Tune applications and SQL queries

Data Flow



Input

- DB2 instrumentation created by selected traces
 - SMF data sets - 100, 101 and 102 records
 - GTF trace files
 - MVS / TSO data sets produced by Collect Report Data
 - ISPF Interface
 - Performance Warehouse in PE Client
 - Data created by the SAVE command

Output

- Traces and Reports
 - Traces show individual DB2 events in order of occurrence
 - Reports show these events summarized by OMPE identifiers, such as primary authorization ID or plan name
- Data sets with formatted data
 - Use for future reports
 - Load into DB2 tables such as the OMPE Performance Warehouse
- Logs that contain information about OMPE processing
 - The Exception Log identifies records that exceed user limits
 - The IFCID Frequency Distribution Log provides counts of input records by IFCID
 - The Job Summary Log provides a summary of events during OMPE execution
 - The DPMLOG Execution Log shows messages issued during OMPE processing

Report Sets

- Statistics
 - A system-wide view of data
 - Traces show delta values
 - Reports are summarized statistics over user defined intervals
- Accounting
 - Thread related traces and reports
 - SMF/GTF record is written when
 - A thread terminates
 - A thread is reused
 - DBAT (DB access thread) becomes inactive
 - Parallel task completes
 - Contains local and distributed DB2 activity associated with a thread
 - Contains DBRM/Package accounting information

Report Sets

■ Locking

- Provides detailed lock information
 - DB2 transaction locks
 - Suspensions / Timeouts / Deadlocks
 - DB2 drain locks and DB2 claims
 - DB2 lock avoidance and related data, like page latches
 - Global locks in a data sharing environment

■ SQL Activity

- Reports based on SQL statement level
- Based on threads
- Trace and Reports include
 - Trigger and nesting level information
 - Events and time spent in DDF processing
 - Time spent in signon, autobind processing
 - Time spent in thread creation and termination

Report Sets

- I/O Activity
 - Shows performance of the I/O events for a database and resources
 - Helps identify potential bottlenecks related to I/O activity
 - One summary report and several detail reports for
 - Active Log
 - Archive Log & Bootstrap Data Set
 - Buffer pool
 - EDM pool
 - Cross-Invalidation in a data sharing environment
- System Parameters
 - Provides information about the configuration parameters of a DB2 system

Report Sets

- Audit
 - Tracks DB2 resource access
 - Helps identifying potential security violations
 - Helps monitoring the granting and revoking of privileges
 - Not strictly a performance report
- Record Trace
 - Presents a listing of DB2 trace records in following levels:
 - Summary
 - Short or Long
 - Dump
- Utility Activity
 - Provides information on the utility and bind activity taking place during the processing of a DB2 application

Report Sets

- Explain
 - Provides access path information for a given SQL statement
 - Access type
 - Indexes to be used
 - Order of table access
 - Order of table join
 - The join method chosen
 - Sort information
 - Locking strategy
 - DB2 catalog information

Fundamental Commands

- TRACE
 - Presents individual or logically related DB2 trace data
- FILE
 - Writes trace data to a data set, loadable to the PDB / PWH
- REPORT
 - Presents consolidated data by selected identifiers and time intervals
- REDUCE
 - Consolidates records with certain common characteristics into a single record
- SAVE
 - Writes consolidated data to a VSAM data set
 - After conversion loadable to the PDB / PWH
- RESTORE
 - Loads consolidated data from a VSAM data set

Useful Subcommands

- Intervals and time frames
 - DATEFORMAT (mm/dd/yy, hh:mm:ss.th)
 - FROM and TO start and end date and time
 - INTERVAL to specify summary interval length
 - BOUNDARY to control alignment of intervals
- Report volume and consolidation controls
 - SHORT for overview report
 - LONG for detailed report
 - TOP to find highest values for a specified field
 - INCLUDE and EXCLUDE to specify filters

Sample Statistics Report Job

```
//jobname  JOB CLASS=A,MSGCLASS=H,NOTIFY=&SYSUID
//PEV410    EXEC PGM=DB2PM
//STEPLIB   DD   DSN=hlq.RKANMOD,DISP=SHR
//INPUTDD   DD   DSN=input.trace.records,DISP=SHR
//STWORK    DD   DCB=(RECFM=VBS,LRECL=32756,BLKSIZE=6233),
//           SPACE=(CYL,(50,50))
//DPMLOG     DD   SYSOUT=*
//STRPTDD    DD   SYSOUT=*
//SYSOUT     DD   SYSOUT=*
//SYSIN      DD   *

STATISTICS

        REDUCE

                INTERVAL (60)

        REPORT

                FROM (01/15/08,00:00:00.00)
                TO (01/15/08,23:59:59.99)
                DDNAME (STRPTDD)
                LAYOUT (SHORT)
                NOEXCEPTION

EXEC
//
```

Sample Accounting Report Job

```
//jobname  JOB  CLASS=A,MSGCLASS=H,NOTIFY=&SYSUID
//PEV410    EXEC  PGM=DB2PM
//STEPLIB   DD   DSN=hlq.RKANMOD,DISP=SHR
//INPUTDD   DD   DSN=input.trace.records,DISP=SHR
//DPMLOG    DD   SYSOUT=*
//ACRPTDD   DD   SYSOUT=*
//SYSOUT    DD   SYSOUT=*
//SYSIN     DD   *

ACCOUNTING

        REPORT

                FROM(01/15/08,00:00:00.00)

                TO(01/15/08,23:59:59.99)

                DDNAME (ACRPTDD)

                LAYOUT (LONG)

                INCLUDE (PLANNAME(planname))

EXEC

//
```

Rules of Thumb

- EDM Pool
 - LOAD CT SECT FROM DASD / REQ FOR CT SECTIONS
 - Should approach 0% for high volume transactions
 - LOAD DBD FROM DASD / REQUESTS FOR DBD
 - Should approach 0% for high volume transactions
 - Otherwise, 20% is acceptable
 - FREE PG IN FREE CHAIN / PAGES IN EDM POOL
 - EDM Pool too large if > 20%
 - FAILS DUE TO POOL FULL
 - EDM Pool too small

Rules of Thumb

■ Buffer Pool

— DWT

- Number of times Deferred Write Threshold reached
- Application dependent, but should be close to 0 if BP is large

— VDWQT

- Number of times Vertical Deferred Write Threshold reached
- Should be 0 - increase BP size or VDWQT level

— SPTH (90%)

- Should be 0, increase BP if greater than 5%

— DMTH (95%)

- Should be 0, increase BP not

— BP Hit Ratio

- Application dependent
- 80% for random is good
- 100% for sequential is good

Documentation

- SC18-9983 Reporting User's Guide Version 4.1.0
 - How to use reports for performance monitoring
- SC18-9984 Report Reference Version 4.1.0
 - Report descriptions
- SC18-9985 Report Command Reference Version 4.1.0
 - Report commands and subcommands